

**AIR DISPERSION MODELING AND CLASS II VISIBILITY ANALYSIS
FOR THE PROPOSED HYPERION ENERGY CENTER IN
UNION COUNTY, SOUTH DAKOTA**

ADDENDUM 1



Prepared by:



RTP Environmental Associates
304A West Millbrook Rd.
Raleigh, NC 27609

Original Submittal - December 2007
Addendum 1 – May 2008

Table of Contents

1.0	SUMMARY	1
4.0	AERMOD APPLICATION	2
4.1	AERMET	2
5.0	SOURCE INPUT DATA, POLLUTANTS, GROUPINGS, AND PRELIMINARY ANALYSES	4
5.1	Source Parameters	4
6.0	AERMOD RESULTS	5
6.1	Significant Impact Analysis Results	5
6.2	NAAQS and PSD Increment Analysis Results	5
6.3	One Microgram per Cubic Meter Footprints	8
6.4	Summary and Conclusions	8
7.0	CLASS II VISIBILITY ANALYSIS	12

Tables and Figures

Table 6-1.	Significant Impact Analysis Results	6
Table 6-2.	NAAQS and Increment Analysis Results	7
Table 7-1.	Level-1 Class II Visibility Analysis Results	13
Table 7-2.	PLUVUE II Class II Visibility Analysis Results	15
Figure 6-1.	PM-10 Annual 1 $\mu\text{g}/\text{m}^3$ Footprint	9
Figure 6-2.	SO ₂ Annual 1 $\mu\text{g}/\text{m}^3$ Footprint	10
Figure 6-3.	NO _x Annual 1 $\mu\text{g}/\text{m}^3$ Footprint	11

1.0 SUMMARY

RTP Environmental (RTP) conducted an air quality modeling analysis to assess the ambient impacts from the proposed Hyperion Energy Center (HEC) in Union County, South Dakota. The analysis was submitted to the South Dakota Department of Environment and Natural Resources (DENR) in December of 2007. Since the analysis was submitted, Hyperion has added emission units that were not included in the original modeling analysis and has changed the emission rates for several sources. In addition, the US EPA has released a revised processor, AERSURFACE, for processing the meteorological data that are used as input to the dispersion modeling analysis. The modeling has therefore been revised to incorporate the model source changes as well as the revised meteorological data. This addendum presents the revised input data and revised results. Only the portions of the December 2007 analysis that have changed are presented herein. For a complete description of model procedures, please refer to the original model documentation.

In summary, none of the conclusions drawn from the original modeling study are affected by the revisions to the modeling analysis. The quality analysis demonstrates that facility-wide, potential emissions from the proposed HEC will not cause or contribute to an exceedance of a NAAQS or increment.

4.0 AERMOD APPLICATION

4.1 AERMET

The meteorological data pre-processor AERMET was used to develop meteorological data for the AERMOD modeling system. The AERMET software processes surface meteorological data and twice-daily upper air sounding data into the proper format using a three-stage process. The first stage extracts the data and administers several data quality checks. The second stage merges the data, and the third stage estimates the required boundary layer parameters and writes the data in a format readable by AERMOD.

Five years (2000-2004) of meteorological data were processed for use in the analysis. Sequential hourly surface data from the National Weather Service (NWS) station in Sioux Falls, SD (WBAN No. 14944) and upper air data from the NWS station in Omaha, NE (WBAN No. 94980) were used. The profile base elevation was set equal to the Sioux Falls station elevation of 433m.

The data were processed into a “model-ready” format using the latest version of AERMET (version 06341). The AERMET meteorological processor also requires estimates of the following surface characteristics: surface roughness length, albedo, and Bowen ratio. The surface roughness length is related to the height of obstacles to the wind flow. The surface roughness length influences the surface shear stress and is an important factor in calculating mechanical turbulence and stability. The albedo is the fraction of the total incident solar radiation reflected by the surface back to space without absorption. The Bowen ratio is an indicator of surface moisture and is the ratio of the sensible heat flux to the latent heat flux. The albedo and Bowen ratio are used for determining the planetary boundary layer parameters for convective conditions due to the surface sensible heat flux.

Estimates of the surface characteristics were made using EPA’s AERSURFACE program and USGS Land Cover data (NLCD92 data). Eight sectors of 45 degrees each

were used in the AERSURFACE analysis. The raw and processed meteorological data are provided on the attached CD.

According to the EPA's AERMOD Implementation Guide¹, the surface characteristics should be similar for the NWS meteorological station and the study site. Based upon visual observation of aerial photographs of both the Sioux Falls, SD NWS and the proposed HEC site, RTP determined that the sites possess similar surface characteristics and that the Sioux Falls data are representative of the HEC site.

¹ AERMOD Implementation Guide, EPA, September 27, 2005.

5.0 SOURCE INPUT DATA, POLLUTANTS, GROUPINGS, AND PRELIMINARY ANALYSES

5.1 Source Parameters

A total of 87 new point sources will be constructed as part of the proposed project. All modeled source input data, including emission rates, can be found in Appendix A to this report.

6.0 AERMOD RESULTS

Appendix B to this report provides the model summary output. AERMOD input and output files, including the BPIP-PRIME files, are included on the enclosed CD.

6.1 Significant Impact Analysis Results

The significant impact analysis results are presented in Table 6-1. As shown, the project is expected to result in significant impacts for PM-10, SO₂, and NO_x. A more refined NAAQS and increment analysis was therefore conducted for each of these pollutants. Please also note that the significant monitoring concentration levels were also predicted to be exceeded due to emissions of SO₂ and PM-10. Existing ambient background pollutant data were used in lieu of site-specific preconstruction monitoring data in this modeling evaluation.

6.2 NAAQS and PSD Increment Analysis Results

The results of the NAAQS and increment analysis are presented in Table 6-2. The maximum combined impacts from all sources are presented. A background concentration was added to the modeled impacts in assessing compliance with the NAAQS. The background values were recommended by the South Dakota DENR. As shown, the model demonstrates compliance with the NAAQS and PSD increments for all pollutants.

Table 6-1. Significant Impact Analysis Results

Pollutant	Averaging Period	Maximum Modeled Impact ($\mu\text{g}/\text{m}^3$)	PSD Significant Class II Impact Level ($\mu\text{g}/\text{m}^3$)	Significant Monitoring Concentration ($\mu\text{g}/\text{m}^3$)	Maximum Distance to a Significant Impact (km)
PM-10	24-hour	19.9	5	10	5.9
	Annual	3.03	1	N/A	3.0
SO ₂	3-hour	199	25	N/A	11.8
	24-hour	55.9	5	13	11.7
	Annual	4.71	1	N/A	3.5
NO _x	Annual	2.40	1	14	2.7
CO	1-hour	1609	2,000	N/A	NA
	8-hour	464	500	575	NA

N/A – not applicable

Table 6-2. NAAQS and Increment Analysis Results

Pollutant	Averaging Period	Concentration ($\mu\text{g}/\text{m}^3$) ^a	Background Concentration ($\mu\text{g}/\text{m}^3$)	Total Concentration ($\mu\text{g}/\text{m}^3$)	Standard	%Standard	Analysis
PM-10	24-hr	30.30	49	79	150	53%	NAAQS
	ANNUAL	3.60	19	23	50	45%	NAAQS
	24-hr	28.07	NA	28	30	94%	Increment ^b
	ANNUAL	3.56	NA	3.56	17	21%	Increment
PM-2.5	24-hr	11.30	23	34.3	35	98%	NAAQS
	ANNUAL	2.94	9	11.9	15	80%	NAAQS
SO ₂	3-hr	141.8	21	163	1300	13%	NAAQS
	24-hr	49.81	5	54.8	365	15%	NAAQS
	ANNUAL	5.86	3	8.9	80	11%	NAAQS
	3-hr	141.8	NA	142	512	28%	Increment
	24-hr	49.81	NA	49.8	91	55%	Increment
	ANNUAL	5.78	NA	5.8	20	29%	Increment
NO _x	ANNUAL	3.35	10	13.3	100	13%	NAAQS
	ANNUAL	3.20	NA	3.2	25	13%	Increment

^aMaximum impacts are presented for the annual averaging period. Highest second high values are presented for the short-term averaging periods, including PM-10. Highest 8th high value is presented for the 24-hour average PM-2.5 concentration.

^bThe maximum modeled concentration is attributable to an off-site (i.e., non-Hyperion) source. HEC's contribution to this impact is less than 1 $\mu\text{g}/\text{m}^3$.

6.3 One Microgram per Cubic Meter Footprints

The South Dakota DENR requested that Hyperion provide annual $1 \mu\text{g}/\text{m}^3$ impact footprints for each of the pollutants with PSD increments. These footprints are provided in Figures 6-1 through 6-3.

6.4 Summary and Conclusions

Emissions of regulated pollutants were evaluated in a dispersion modeling analysis. The modeling demonstrates that the ground level concentrations of each pollutant are below the levels designed to protect human health and welfare. The modeling input and output files are provided on the attached CD. Model summary results are presented in Appendix B to this report. The summary results list the model file names associated with each phase of the analysis.²

² As a general rule, the AERMOD input files have a “dta” extension. The AERMOD output files have a “lst” extension.

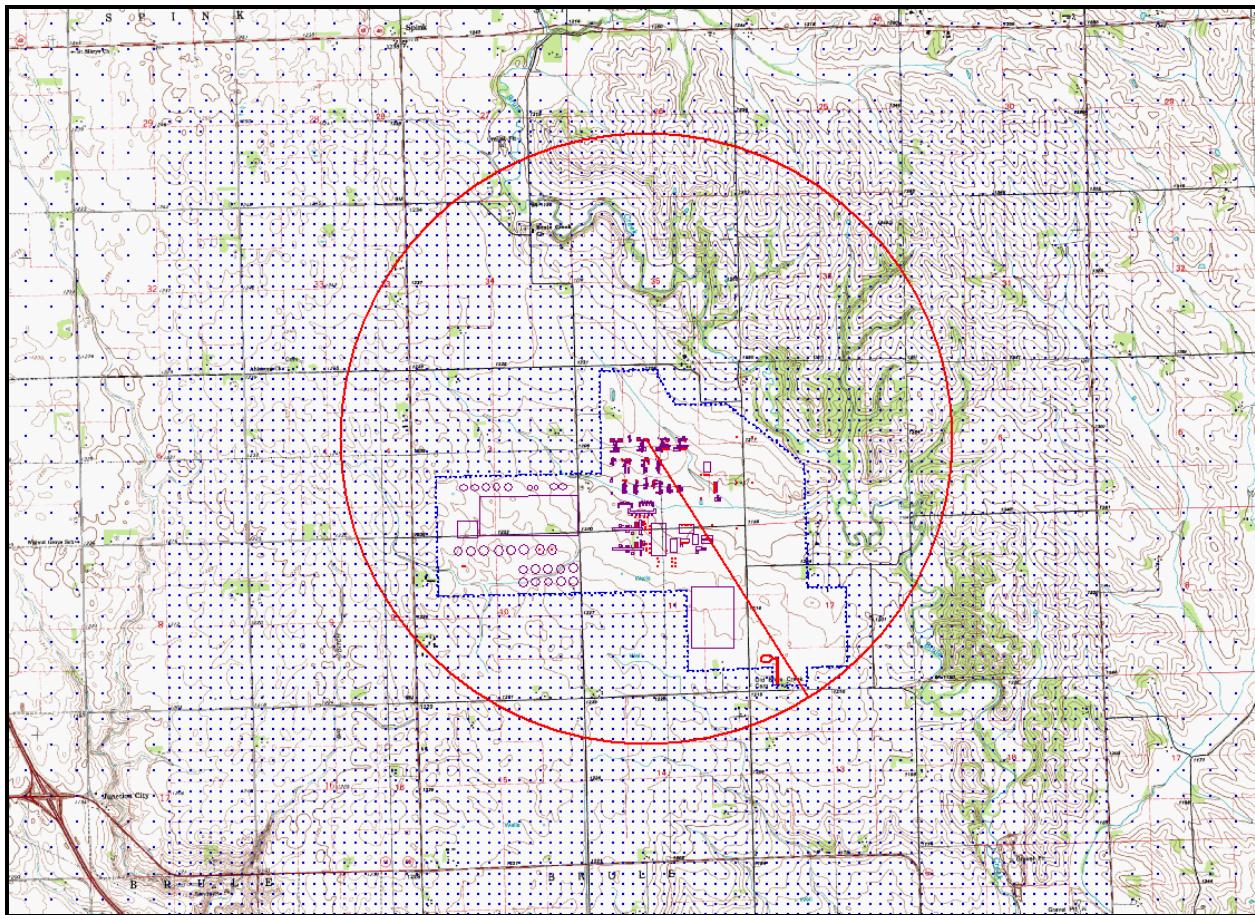


Figure 6-1. PM-10 Annual 1 $\mu\text{g}/\text{m}^3$ Footprint

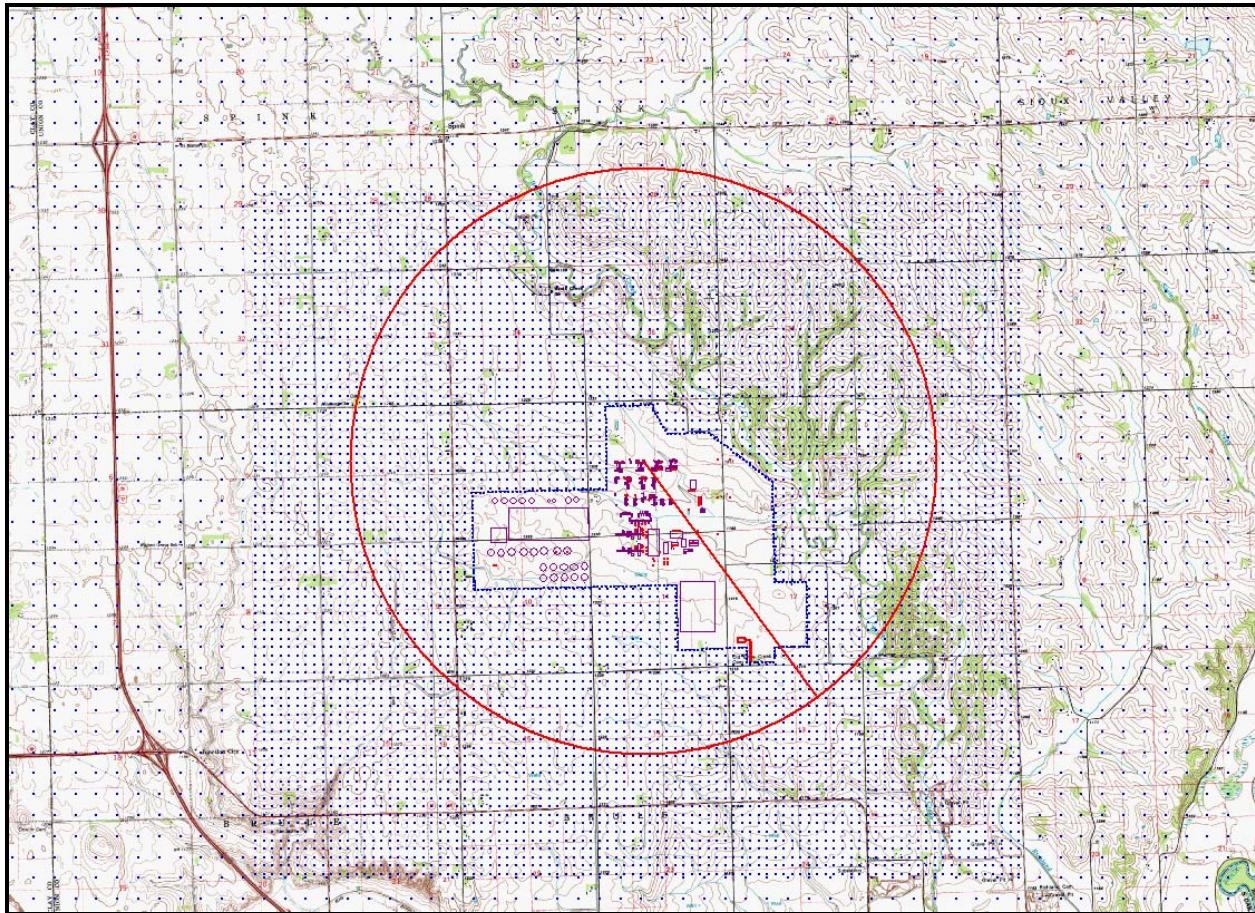


Figure 6-2. SO₂ Annual 1 µg/m³ Footprint

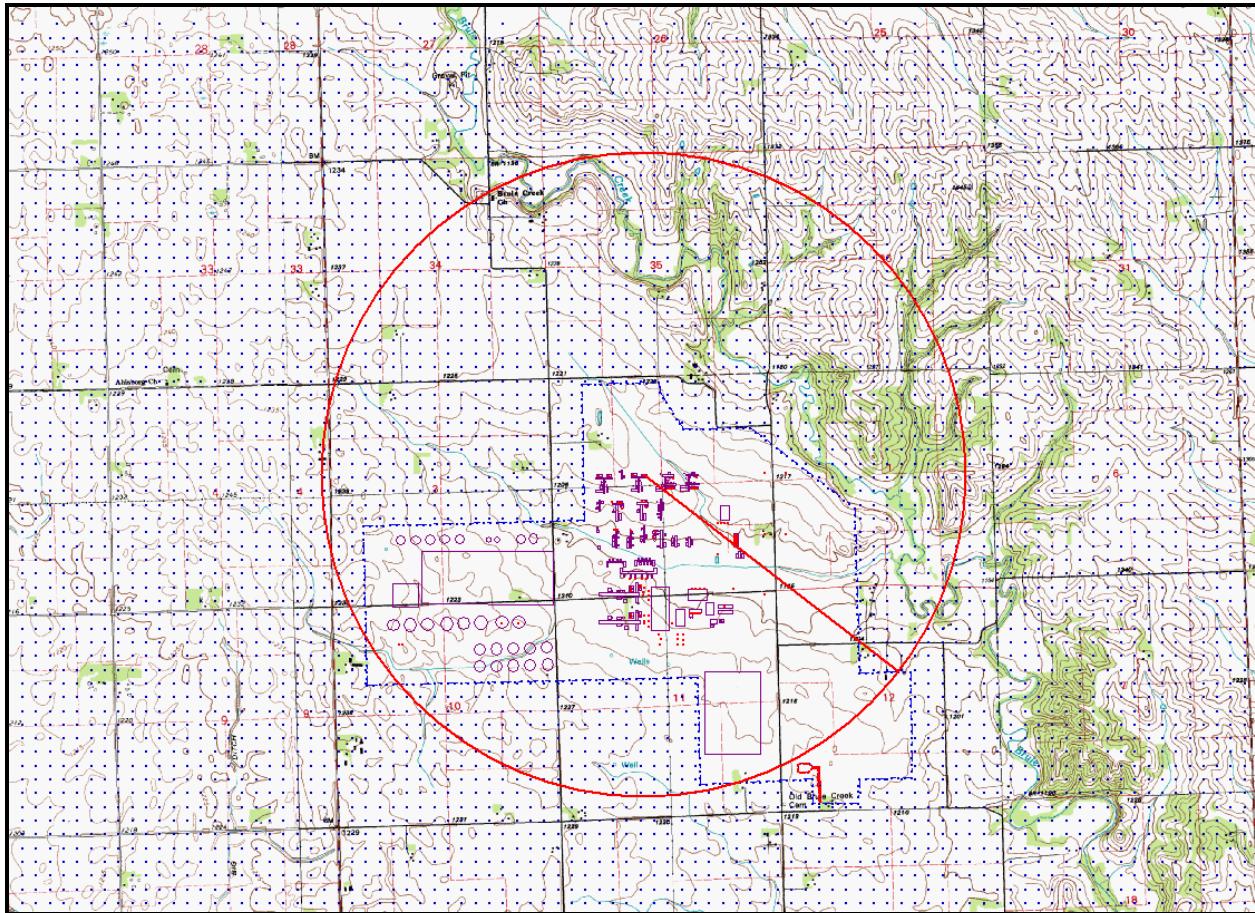


Figure 6-3. NO_x Annual 1 $\mu\text{g}/\text{m}^3$ Footprint

7.0 CLASS II VISIBILITY ANALYSIS

Emission rates for PM and NO_x for the Level-1 analysis were set to 249 lb/hr and 281 lb/hr, respectively. These emissions represent the total facility emission proposed as part of the modification.

The results of the revised Level-1 screening analysis are presented in Table 7-1. As shown, visibility is not anticipated to be affected using the conservative assumptions associated with the VISCREEN Level-1 analysis, except at the Missouri National Recreational River. Exceedances of the default delta E and green contrast parameters were calculated at this park. Values in excess of the applicable screening level values are presented in Table 7-1 in bold italics. Therefore a more refined Level-3 PLUVUE II analysis was performed. For the more refined analysis, screening values for Delta E (1.0) and contrast (0.02) were assumed.

The results of the revised PLUVUE analysis are shown in Table 7-2. As shown, the maximum calculated plume contrast and delta e values are below the threshold values, demonstrating that the facility should not impact visibility at the park. The VISCREEN and PLUVUE II model files can be found on the attached disk.

Table 7-1. Level-1 Class II Visibility Analysis Results

Viewing Background	Theta (degrees)	Azimuth (degrees)	Distance (km)	Alpha (degrees)	Delta E		Green Contrast	
					Criterion	Plume	Criterion	Plume
Homestead National Monument								
SKY	10	65	155.8	104	2	0.351	0.05	0.004
SKY	140	65	155.8	104	2	0.061	0.05	-0.003
TERRAIN	10	60	152.7	109	2	0.077	0.05	0.001
TERRAIN	140	60	152.7	109	2	0.021	0.05	0.001
Lewis & Clark National Historic Trail								
SKY	10	40	87.4	129	2	1.259	0.05	0.013
SKY	140	40	87.4	129	2	0.229	0.05	-0.011
TERRAIN	10	50	92.6	119	2	0.56	0.05	0.006
TERRAIN	140	50	92.6	119	2	0.131	0.05	0.005
Niobrara National Scenic River								
SKY	10	40	83.2	129	2	1.431	0.05	0.015
SKY	140	40	83.2	129	2	0.265	0.05	-0.012
TERRAIN	10	50	88.2	119	2	0.672	0.05	0.007
TERRAIN	140	50	88.2	119	2	0.154	0.05	0.005
Pipestone National Monument								
SKY	10	35	73.1	134	2	1.827	0.05	0.02
SKY	140	35	73.1	134	2	0.34	0.05	-0.016
TERRAIN	10	50	80.4	119	2	0.941	0.05	0.01
TERRAIN	140	50	80.4	119	2	0.207	0.05	0.008

Viewing Background	Theta (degrees)	Azimuth (degrees)	Distance (km)	Alpha (degrees)	Delta E		Green Contrast	
					Criterion	Plume	Criterion	Plume
Missouri National Recreational River								
SKY	10	1	1	168	2	25.439*	0.05	.448*
SKY	140	1	1	168	2	5.783*	0.05	-.249*
TERRAIN	10	1	1	168	2	36.797*	0.05	.438*
TERRAIN	140	1	1	168	2	11.962*	0.05	.435*

Table 7-2. PLUVUE II Class II Visibility Analysis Results

Day	Delta E		Green Contrast	
	Criterion	Plume	Criterion	Plume
March 21	1.0	0.194	0.02	0.002
June 21	1.0	0.228	0.02	0.002
September 21	1.0	0.193	0.02	0.001
December 21	1.0	0.184	0.02	0.000

APPENDIX A
MODEL INPUT DATA

Hyperion Sources (NAD27, Zone 14)

Point Sources

Model Source No.	Analysis	Source ID	Stack Release Type	Source Description	Base			Exit		Stack		PM25		NOX		NH3	
					Easting (X) (m)	Northing (Y) (m)	Elevation (ft)	Stack Height (ft)	Temp. (°F)	Velocity (ft/sec)	Diameter (ft)	PMTE (lb/hr)	SO2 (lb/hr)	CO (lb/hr)	NH3 (lb/hr)		
66	SIGNIF.NAAQS&INC	COAL5	DEFAULT	Rail Unloading Bldg	686652.00	4741525.00	1220	40	80	47.18	3.0	0.838	0.838	0.000	0.000	0.000	0.000
67	SIGNIF.NAAQS&INC	COAL6	DEFAULT	Rail Unloading Bldg	686774.19	4741521.00	1220	40	80	23.59	3.0	0.419	0.419	0.000	0.000	0.000	0.000
68	SIGNIF.NAAQS&INC	COAL7	DEFAULT	Rail Loading Bldg	686812.50	4741519.00	1220	40	80	23.59	3.0	0.419	0.419	0.000	0.000	0.000	0.000
69	SIGNIF.NAAQS&INC	COOL1	DEFAULT	Cooling Tower Cell 1	687188.13	4742281.00	1220	50	-460	22.00	35.0	0.094	0.094	0.000	0.000	0.000	0.000
70	SIGNIF.NAAQS&INC	COOL2	DEFAULT	Cooling Tower Cell 2	687200.75	4742281.00	1220	50	-460	22.00	35.0	0.094	0.094	0.000	0.000	0.000	0.000
71	SIGNIF.NAAQS&INC	COOL3	DEFAULT	Cooling Tower Cell 3	687187.38	4742266.00	1220	50	-460	22.00	35.0	0.094	0.094	0.000	0.000	0.000	0.000
72	SIGNIF.NAAQS&INC	COOL4	DEFAULT	Cooling Tower Cell 4	687200.75	4742265.50	1220	50	-460	22.00	35.0	0.094	0.094	0.000	0.000	0.000	0.000
73	SIGNIF.NAAQS&INC	COOL5	DEFAULT	Cooling Tower Cell 5	687187.38	4742249.50	1220	50	-460	22.00	35.0	0.094	0.094	0.000	0.000	0.000	0.000
74	SIGNIF.NAAQS&INC	COOL6	DEFAULT	Cooling Tower Cell 6	687200.75	4742250.50	1220	50	-460	22.00	35.0	0.094	0.094	0.000	0.000	0.000	0.000
75	SIGNIF.NAAQS&INC	COOL7	DEFAULT	Cooling Tower Cell 7	687187.38	4742233.50	1220	50	-460	22.00	35.0	0.094	0.094	0.000	0.000	0.000	0.000
76	SIGNIF.NAAQS&INC	COOL8	DEFAULT	Cooling Tower Cell 8	687200.75	4742234.00	1220	50	-460	22.00	35.0	0.094	0.094	0.000	0.000	0.000	0.000
77	SIGNIF.NAAQS&INC	COOL9	DEFAULT	Cooling Tower Cell 9	687187.38	4742218.50	1220	50	-460	22.00	35.0	0.094	0.094	0.000	0.000	0.000	0.000
78	SIGNIF.NAAQS&INC	COOL10	DEFAULT	Cooling Tower Cell 10	687200.75	4742219.50	1220	50	-460	22.00	35.0	0.094	0.094	0.000	0.000	0.000	0.000
79	SIGNIF.NAAQS&INC	COOL11	DEFAULT	Cooling Tower Cell 11	687187.38	4742206.50	1220	50	-460	22.00	35.0	0.094	0.094	0.000	0.000	0.000	0.000
80	SIGNIF.NAAQS&INC	COOL12	DEFAULT	Cooling Tower Cell 12	687200.75	4742205.50	1220	50	-460	22.00	35.0	0.094	0.094	0.000	0.000	0.000	0.000
81	SIGNIF.NAAQS&INC	COOL13	DEFAULT	Cooling Tower Cell 13	687186.69	4742194.00	1220	50	-460	22.00	35.0	0.094	0.094	0.000	0.000	0.000	0.000
82	SIGNIF.NAAQS&INC	FIREWP1	DEFAULT	Fire Water Pump No. 1	684740.00	4741479.00	1220	25	850	267.00	1.0	0.992	0.992	0.037	1.087	17.361	0.000
83	SIGNIF.NAAQS&INC	FIREWP2	DEFAULT	Fire Water Pump No. 2	684770.00	4741479.00	1220	25	850	267.00	1.0	0.992	0.992	0.037	1.087	17.361	0.000
84	SIGNIF.NAAQS&INC	GEN1	DEFAULT	Emergency Generator No. 1	687063.00	4742365.00	1220	25	950	109.00	1.0	0.265	0.265	0.010	0.290	4.630	0.000
85	SIGNIF.NAAQS&INC	GEN2	DEFAULT	Emergency Generator No. 2	687088.00	4742365.00	1220	25	950	109.00	1.0	0.265	0.265	0.010	0.290	4.630	0.000
86	SIGNIF.NAAQS&INC	GEN3	DEFAULT	Emergency Generator No. 3	687113.00	4742365.00	1220	25	950	109.00	1.0	0.265	0.265	0.010	0.290	4.630	0.000
87	SIGNIF.NAAQS&INC	GEN4	DEFAULT	Emergency Generator No. 4	687138.00	4742365.00	1220	25	950	109.00	1.0	0.265	0.265	0.010	0.290	4.630	0.000

Volume Sources

Model Source No.	Analysis	Source ID	Source Description	Easting (X)	Northing (Y)	Base Elevation (ft)	Release Height (ft)	Horizontal	Vertical	PM25		SO2 (lb/hr)	NOX (lb/hr)	CO (lb/hr)	NH3 (lb/hr)
								Dimension (ft)	Dimension (ft)	PMTEN (lb/hr)	PMF (lb/hr)				
150	SIGNIF,NAAQS&INC	ROAD44	Gasoline and Propane Customer Road	687797.60	4740436.06	1220	15.0	27.6	14.0	6.54E-03	9.68E-04	0.0000	0.0000	0.0000	0.0000
151	SIGNIF,NAAQS&INC	ROAD45	Gasoline and Propane Customer Road	687798.14	4740418.08	1220	15.0	27.6	14.0	6.54E-03	9.68E-04	0.0000	0.0000	0.0000	0.0000
152	SIGNIF,NAAQS&INC	ROAD46	Gasoline and Propane Customer Road	687798.68	4740400.11	1220	15.0	27.6	14.0	6.54E-03	9.68E-04	0.0000	0.0000	0.0000	0.0000
153	SIGNIF,NAAQS&INC	ROAD47	Gasoline and Propane Customer Road	687799.21	4740382.13	1220	15.0	27.6	14.0	6.54E-03	9.68E-04	0.0000	0.0000	0.0000	0.0000
154	SIGNIF,NAAQS&INC	ROAD48	Gasoline and Propane Customer Road	687799.75	4740364.16	1220	15.0	27.6	14.0	6.54E-03	9.68E-04	0.0000	0.0000	0.0000	0.0000
155	SIGNIF,NAAQS&INC	ROAD49	Gasoline and Propane Customer Road	687800.29	4740346.18	1220	15.0	27.6	14.0	6.54E-03	9.68E-04	0.0000	0.0000	0.0000	0.0000

APPENDIX B
MODEL SUMMARY OUTPUT

4/21/07 Hyperion Final Permit Application AERMOD Summary Results

Model	File	Pol	Average	Group	Rank	Conc.	East(X)	North(Y)	Elev	Hill	Time	Met File	Sources	Groups	Rec.
AERMOD	3-08 Hyperion_2001_SO2.USISO2		ANNUAL	INCRM'T	1ST	5.78414	686767.6	4741237.5	370.75	370.75	1 YRS	SIOUXF01.S	71	5	9583
AERMOD	3-08 Hyperion_2002_SO2.USISO2		ANNUAL	INCRM'T	1ST	5.17673	686915.1	4741241	370	370	1 YRS	SIOUXF02.S	71	5	9583
AERMOD	3-08 Hyperion_2003_SO2.USISO2		ANNUAL	INCRM'T	1ST	5.54216	686915.1	4741241	370	370	1 YRS	SIOUXF03.S	71	5	9583
AERMOD	3-08 Hyperion_2004_SO2.USISO2		ANNUAL	INCRM'T	1ST	5.30349	686915.1	4741241	370	370	1 YRS	SIOUXF04.S	71	5	9583
AERMOD	3-08 Hyperion_2000_SO2.USISO2		ANNUAL	NAAQS	1ST	5.76465	686816.8	4741238.5	370	370	1 YRS	SIOUXF00.S	71	5	9583
AERMOD	3-08 Hyperion_2001_SO2.USISO2		ANNUAL	NAAQS	1ST	5.8567	686767.6	4741237.5	370.75	370.75	1 YRS	SIOUXF01.S	71	5	9583
AERMOD	3-08 Hyperion_2002_SO2.USISO2		ANNUAL	NAAQS	1ST	5.24679	686915.1	4741241	370	370	1 YRS	SIOUXF02.S	71	5	9583
AERMOD	3-08 Hyperion_2003_SO2.USISO2		ANNUAL	NAAQS	1ST	5.62003	686915.1	4741241	370	370	1 YRS	SIOUXF03.S	71	5	9583
AERMOD	3-08 Hyperion_2004_SO2.USISO2		ANNUAL	NAAQS	1ST	5.37146	686915.1	4741241	370	370	1 YRS	SIOUXF04.S	71	5	9583
AERMOD	3-08 Hyperion_2000_SO2.USISO2		ANNUAL	OFFSITE	1ST	1.47148	699000	4731000	417	444	1 YRS	SIOUXF00.S	71	5	9583
AERMOD	3-08 Hyperion_2001_SO2.USISO2		ANNUAL	OFFSITE	1ST	1.64191	699000	4731000	417	444	1 YRS	SIOUXF01.S	71	5	9583
AERMOD	3-08 Hyperion_2002_SO2.USISO2		ANNUAL	OFFSITE	1ST	1.51377	699000	4731000	417	444	1 YRS	SIOUXF02.S	71	5	9583
AERMOD	3-08 Hyperion_2003_SO2.USISO2		ANNUAL	OFFSITE	1ST	1.88278	699000	4731000	417	444	1 YRS	SIOUXF03.S	71	5	9583
AERMOD	3-08 Hyperion_2004_SO2.USISO2		ANNUAL	OFFSITE	1ST	1.81682	699000	4731000	417	444	1 YRS	SIOUXF04.S	71	5	9583
AERMOD	3-08 Hyperion_2000_SO2.USISO2		ANNUAL	SIA	1ST	4.64695	686816.8	4741238.5	370	370	1 YRS	SIOUXF00.S	71	5	9583
AERMOD	3-08 Hyperion_2001_SO2.USISO2		ANNUAL	SIA	1ST	4.71488	686767.6	4741237.5	370.75	370.75	1 YRS	SIOUXF01.S	71	5	9583
AERMOD	3-08 Hyperion_2002_SO2.USISO2		ANNUAL	SIA	1ST	4.11979	686915.1	4741241	370	370	1 YRS	SIOUXF02.S	71	5	9583
AERMOD	3-08 Hyperion_2003_SO2.USISO2		ANNUAL	SIA	1ST	4.38925	686915.1	4741241	370	370	1 YRS	SIOUXF03.S	71	5	9583
AERMOD	3-08 Hyperion_2004_SO2.USISO2		ANNUAL	SIA	1ST	4.12762	686915.1	4741241	370	370	1 YRS	SIOUXF04.S	71	5	9583

AERMOD 5-Yr Summary (4/21/08)

Pollutant	Average	Group	Rank	Conc.	Bckgnd	Total	Standard	%Standard	Analysis	Distance to Sign. (km)		Comments
										Significance	NA	
PMTEN	24-HR	SIA	1ST	19.88	NA	19.9	5	398%	Significance	5.9		
PMTEN	ANNUAL	SIA	1ST	3.03	NA	3.0	1	303%	Significance	3.0		
PMTEN	24-HR	NAAQS	2ND	30.30	49	79	150	53%	NAAQS	NA		
PMTEN	ANNUAL	NAAQS	1ST	3.60	19	23	50	45%	NAAQS	NA		
PMTEN	24-HR	INCRMT	2ND	28.07	NA	28	30	94%	Increment	NA		
PMTEN	ANNUAL	INCRMT	1ST	3.56	NA	3.56	17	21%	Increment	NA		
PMF	24-HR	NAAQS	8TH	11.30	23	34.30	35	98%	NAAQS	NA		
PMF	ANNUAL	NAAQS	1ST	2.94	9	11.94	15	80%	NAAQS	NA		
SO2	3-HR	SIA	1ST	199.16	NA	199.2	25	797%	Significance	11.8		
SO2	24-HR	SIA	1ST	55.92	NA	55.9	5	1118%	Significance	11.7		
SO2	ANNUAL	SIA	1ST	4.71	NA	4.7	1	471%	Significance	3.5		
SO2	3-HR	NAAQS	2ND	141.81	21	162.8	1300	13%	NAAQS	NA		
SO2	24-HR	NAAQS	2ND	49.81	5	54.8	365	15%	NAAQS	NA		
SO2	ANNUAL	NAAQS	1ST	5.86	3	8.9	80	11%	NAAQS	NA		
SO2	3-HR	INCRMT	2ND	141.81	NA	141.8	512	28%	Increment	NA		
SO2	24-HR	INCRMT	2ND	49.81	NA	49.8	91	55%	Increment	NA		
SO2	ANNUAL	INCRMT	1ST	5.78	NA	5.8	20	29%	Increment	NA		
NOX	ANNUAL	SIA	1ST	2.40	NA	2.4	1	240%	Significance	2.7		
NOX	ANNUAL	NAAQS	1ST	3.35	10	13.3	100	13%	NAAQS	NA		
NOX	ANNUAL	INCRMT	1ST	3.20	NA	3.2	25	13%	Increment	NA		
CO	1-HR	SIA	1ST	1608.6	NA	1608.6	2000	80%	Significance	NA		
CO	8-HR	SIA	1ST	463.7	NA	463.7	500	93%	Significance	NA		

PMF=PM Fine (PM2.5)

Visual Effects Screening Analysis for
 Source: Hyperion
 Class I Area: Homestead

*** Level-1 Screening ***

Input Emissions for

Particulates	249.00	LB /HR
NOx (as NO2)	281.00	LB /HR
Primary NO2	.00	LB /HR
Soot	.00	LB /HR
Primary SO4	.00	LB /HR

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04 ppm
Background Visual Range:	59.80 km
Source-Observer Distance:	167.00 km
Min. Source-Class I Distance:	167.00 km
Max. Source-Class I Distance:	169.00 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	6
Wind Speed:	1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
 Screening Criteria ARE NOT Exceeded

	Delta E	Contrast
	=====	=====

Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
=====	=====	=====	=====	=====	====	=====	====	=====
SKY	10.	84.	167.0	84.	2.00	.332	.05	.003
SKY	140.	84.	167.0	84.	2.00	.058	.05	-.003
TERRAIN	10.	84.	167.0	84.	2.00	.059	.05	.001
TERRAIN	140.	84.	167.0	84.	2.00	.016	.05	.000

Maximum Visual Impacts OUTSIDE Class I Area
 Screening Criteria ARE NOT Exceeded

	Delta E	Contrast
	=====	=====

Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
=====	=====	=====	=====	=====	====	=====	====	=====
SKY	10.	65.	155.8	104.	2.00	.351	.05	.004
SKY	140.	65.	155.8	104.	2.00	.061	.05	-.003
TERRAIN	10.	60.	152.7	109.	2.00	.077	.05	.001
TERRAIN	140.	60.	152.7	109.	2.00	.021	.05	.001

Visual Effects Screening Analysis for
 Source: Hyperion
 Class I Area: Lewis & Clark

*** Level-1 Screening ***

Input Emissions for

Particulates	249.00	LB /HR
NOx (as NO2)	281.00	LB /HR
Primary NO2	.00	LB /HR
Soot	.00	LB /HR
Primary SO4	.00	LB /HR

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04 ppm
Background Visual Range:	59.80 km
Source-Observer Distance:	106.00 km
Min. Source-Class I Distance:	106.00 km
Max. Source-Class I Distance:	108.00 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	6
Wind Speed:	1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

Backgrnd	Theta	Azi	Distance	Alpha	Delta E		Contrast	
					Crit	Plume	Crit	Plume
SKY	10.	84.	106.0	84.	2.00	1.113	.05	.012
SKY	140.	84.	106.0	84.	2.00	.227	.05	-.010
TERRAIN	10.	84.	106.0	84.	2.00	.443	.05	.005
TERRAIN	140.	84.	106.0	84.	2.00	.097	.05	.003

Maximum Visual Impacts OUTSIDE Class I Area

Screening Criteria ARE NOT Exceeded

Backgrnd	Theta	Azi	Distance	Alpha	Delta E		Contrast	
					Crit	Plume	Crit	Plume
SKY	10.	40.	87.4	129.	2.00	1.259	.05	.013
SKY	140.	40.	87.4	129.	2.00	.229	.05	-.011
TERRAIN	10.	50.	92.6	119.	2.00	.560	.05	.006
TERRAIN	140.	50.	92.6	119.	2.00	.131	.05	.005

Visual Effects Screening Analysis for

Source: Hyperion

Class I Area: Niobrara

*** Level-1 Screening ***

Input Emissions for

Particulates	249.00	LB /HR
NOx (as NO2)	281.00	LB /HR
Primary NO2	.00	LB /HR
Soot	.00	LB /HR
Primary SO4	.00	LB /HR

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04 ppm
Background Visual Range:	59.80 km
Source-Observer Distance:	101.00 km
Min. Source-Class I Distance:	101.00 km
Max. Source-Class I Distance:	103.00 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	6
Wind Speed:	1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

Backgrnd	Theta	Azi	Distance	Alpha	Delta E		Contrast	
					Crit	Plume	Crit	Plume
SKY	10.	84.	101.0	84.	2.00	1.244	.05	.014
SKY	140.	84.	101.0	84.	2.00	.260	.05	-.011
TERRAIN	10.	84.	101.0	84.	2.00	.532	.05	.006
TERRAIN	140.	84.	101.0	84.	2.00	.114	.05	.004

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE NOT Exceeded

Backgrnd	Theta	Azi	Distance	Alpha	Delta E		Contrast	
					Crit	Plume	Crit	Plume
SKY	10.	40.	83.2	129.	2.00	1.431	.05	.015
SKY	140.	40.	83.2	129.	2.00	.265	.05	-.012
TERRAIN	10.	50.	88.2	119.	2.00	.672	.05	.007
TERRAIN	140.	50.	88.2	119.	2.00	.154	.05	.005

Visual Effects Screening Analysis for

Source: Hyperion

Class I Area: Pipestone

*** Level-1 Screening ***

Input Emissions for

Particulates	249.00	LB /HR
NOx (as NO2)	281.00	LB /HR
Primary NO2	.00	LB /HR
Soot	.00	LB /HR
Primary SO4	.00	LB /HR

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04 ppm
Background Visual Range:	59.80 km
Source-Observer Distance:	92.00 km
Min. Source-Class I Distance:	92.00 km
Max. Source-Class I Distance:	94.00 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	6
Wind Speed:	1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
 Screening Criteria ARE NOT Exceeded

Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
=====	=====	=====	=====	=====	====	=====	====	=====
SKY	10.	84.	92.0	84.	2.00	1.531	.05	.018
SKY	140.	84.	92.0	84.	2.00	.338	.05	-.014
TERRAIN	10.	84.	92.0	84.	2.00	.746	.05	.008
TERRAIN	140.	84.	92.0	84.	2.00	.153	.05	.006

Maximum Visual Impacts OUTSIDE Class I Area
 Screening Criteria ARE NOT Exceeded

Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
=====	=====	=====	=====	=====	====	=====	====	=====
SKY	10.	35.	73.1	134.	2.00	1.827	.05	.020
SKY	140.	35.	73.1	134.	2.00	.340	.05	-.016
TERRAIN	10.	50.	80.4	119.	2.00	.941	.05	.010
TERRAIN	140.	50.	80.4	119.	2.00	.207	.05	.008

Visual Effects Screening Analysis for
 Source: Hyperion
 Class I Area: Missouri

*** Level-1 Screening ***

Input Emissions for

Particulates	249.00	LB /HR
NOx (as NO2)	281.00	LB /HR
Primary NO2	.00	LB /HR
Soot	.00	LB /HR
Primary SO4	.00	LB /HR

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04 ppm
Background Visual Range:	59.80 km
Source-Observer Distance:	13.00 km
Min. Source-Class I Distance:	13.00 km
Max. Source-Class I Distance:	15.00 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	6
Wind Speed:	1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
 Screening Criteria ARE Exceeded

				Delta E	Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume
					====	=====
SKY	10.	120.	15.0	48.	2.00	13.671*
SKY	140.	120.	15.0	48.	2.00	6.008*
TERRAIN	10.	84.	13.0	84.	2.00	29.303*
TERRAIN	140.	84.	13.0	84.	2.00	4.504*
					.05	.101*

Maximum Visual Impacts OUTSIDE Class I Area

Screening Criteria ARE Exceeded

				Delta E	Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume
					====	=====
SKY	10.	1.	1.0	168.	2.00	25.439*
SKY	140.	1.	1.0	168.	2.00	5.783*
TERRAIN	10.	1.	1.0	168.	2.00	36.797*
TERRAIN	140.	1.	1.0	168.	2.00	11.962*
					.05	.435*

1
 PLUVUE II (VERSION 96170)
 AN AIR QUALITY DISPERSION MODEL IN
 THE OTHER MODELS SECTION
 EPA SUPPORT CENTER FOR REGULATORY AIR MODELS

0
 VISUAL IMPACT ASSESSMENT FOR Hyperion December

EMISSIONS SOURCE DATA

ELEVATION OF SITE = 1220. FEET MSL
 372. METERS MSL

NO. OF UNITS = 1.

STACK HEIGHT = 160. FEET
 49. METERS

FLUE GAS FLOW RATE = 168757. CU FT/MIN
 79.63 CU M/SEC

FLUE GAS TEMPERATURE = 426. F
 492. K

FLUE GAS OXYGEN CONTENT = 3.0 MOL PERCENT

SO2 EMISSION RATE (TOTAL) = 2.34 TONS/DAY
 2.457E+01 G/SEC

NOX EMISSION RATE (TOTAL, AS NO2) = 3.37 TONS/DAY
 3.538E+01 G/SEC

PARTICULATE EMISSION RATE (TOTAL) = 2.99 TONS/DAY
 3.140E+01 G/SEC

0

METEOROLOGICAL AND AMBIENT AIR QUALITY DATA

WINDSPEED = 2.2 MILES/HR
 1.0 M/SEC

PASQUILL-GIFFORD-TURNER STABILITY CATEGORY F

LAPSE RATE = 13.82 F/1000 FT
 2.519E-02 K/M

POTENTIAL TEMPERATURE LAPSE RATE = 3.499E-02 K/M

AMBIENT TEMPERATURE = 19.0 F
 265.9 K

RELATIVE HUMIDITY = 76.0 %

MIXING DEPTH = 0.0 M

AMBIENT PRESSURE = 0.96 ATM

BACKGROUND NOX CONCENTRATION = 0.006 PPM

BACKGROUND NO2 CONCENTRATION = 0.006 PPM

BACKGROUND OZONE CONCENTRATION = 0.080 PPM

BACKGROUND SO2 CONCENTRATION = 0.008 PPM

ROG = 0.1500 SIGMA = 2.0000 REFRACTIVE INDEX = 1.5000 + 0.000000
 LOG-NORMAL SIZE DISTRIBUTION (101 POINT HISTOGRAM)
 ROG = 3.0000 SIGMA = 2.2000 REFRACTIVE INDEX = 1.5000 + 0.000000
 LOG-NORMAL SIZE DISTRIBUTION (101 POINT HISTOGRAM)
 ROG = 1.0000 SIGMA = 2.0000 REFRACTIVE INDEX = 1.5000 + 0.000000
 LOG-NORMAL SIZE DISTRIBUTION (101 POINT HISTOGRAM)
 ROG = 0.0500 SIGMA = 2.0000 REFRACTIVE INDEX = 2.0000 + 1.000000
 LOG-NORMAL SIZE DISTRIBUTION (101 POINT HISTOGRAM)

BACKGROUND COARSE MODE CONCENTRATION = 3.0 UG/M3

BACKGROUND SULFATE CONCENTRATION = 2.3 UG/M3

BACKGROUND NITRATE CONCENTRATION = 2.3 UG/M3

BACKGROUND VISUAL RANGE = 64.6 KILOMETERS
 SO2 DEPOSITION VELOCITY = 1.00 CM/SEC
 NOX DEPOSITION VELOCITY = 1.00 CM/SEC
 COARSE PARTICULATE DEPOSITION VELOCITY = 0.10 CM/SEC
 SUBMICRON PARTICULATE DEPOSITION VELOCITY = 0.10 CM/SEC

AEROSOL STATISTICS

	BACKGROUND	PLUME	CARBONACEOUS AEROSOLS		
MASS MEDIAN RADIUS MICROMETERS	ACCUMULATION MODE	COARSE MODE	ACCUMULATION MODE	COARSE MODE	CARBONACEOUS AEROSOLS
	0.150	3.000	0.100	1.000	0.050
GEOMETRIC STANDARD DEVIATION	2.000	2.200	2.000	2.000	2.000
PARTICLE DENSITY G/ (CM**3)	1.500	2.500	1.500	2.500	2.000

CARBONACEOUS FRACTION OF PARTICULATE MASS EMISSIONS = 0.000

BACKGROUND ATMOSPHERIC ELEMENTAL CARBON = 0.020 UG/M**3

0

GEOMETRY OF USER-SPECIFIED PLUME-OBSERVER-SUN ORIENTATION

WIND DIRECTION (DEGREES) = 40.0

 WARNING: The time has been reset from 754.
 to 774. to avoid zenith angles greater than 88.00

SIMULATION IS FOR 774. HOURS ON 12/21

SOLAR ZENITH ANGLE (DEGREES) = 87.9

SOLAR AZIMUTH ANGLE (DEGREES) = 125.2

GEOMETRIES FOR LINES-OF-SIGHT THROUGH PLUME PARCELS AT GIVEN DOWNWIND DISTANCES (X)

X (KM)	AZIMUTH	RP	ALPHA	BETA	THETA
1.0	51.0	13.1	11.0	0.6	74.2
2.5	52.4	11.6	12.4	0.7	72.8
5.0	55.7	9.2	15.7	0.9	69.5
10.0	73.0	4.6	33.0	1.9	52.2
13.0	111.4	2.6	71.4	3.2	13.8

1 BACKGROUND CONDITIONS

ACCUMULATION MODE MASS RADIUS SIGMA BSCAT.55/MASS AT.55/MASS	COARSE PARTICLE MODE MASS RADIUS SIGMA BSCAT.55/MASS	PRIMARY PARTICLE MODE MASS RADIUS SIGMA BSC
0.1500E+00 0.2000E+01 0.1066E-01 0.1045E-02	0.3000E+01 0.2200E+01 0.3219E-03	0.1000E+01 0.2000E+01

REFRACTION INDEXES

ACCUMULATION MODE = 0.1500E+01 + I 0.0000E+00
 COARSE MODE = 0.1500E+01 + I 0.0000E+00
 PRIMARY AEROSOLS = 0.1500E+01 + I 0.0000E+00
 CARBONACEOUS AEROSOLS = 0.2000E+01 + I 0.1000E+01

COEFFICIENTS AT 0.55 MICROMETERS , 1./KM
 BTARAY =0.1119E-01 BTAAER =0.4910E-01 ABSNO2 =0.1860E-02 BTABAC =0.6052E-01

0

CONCENTRATIONS OF AEROSOL AND GASES CONTRIBUTED BY

Hyperion December

DOWNDOWN DISTANCE (KM) = 1.0
 PLUME ALTITUDE (M) = 148.
 SIGMA Y (M) = 46.
 SIGMA Z (M) = 17.
 SO2-SO4 CONVERSION RATE= 0.0000 PERCENT/HR
 NOX-NO3 CONVERSION RATE= 0.0000 PERCENT/HR

ALTITUDE TAL -1)	BSPSN/BSP (%)	NOX (PPM)	NO2 (PPM)	NO3- (PPM)	NO2/NTOT (MOLE %)	NO3-/NTOT (MOLE %)	SO2 (PPM)	SO4=/ (UG/M3)	SO4=/STOT (MOLE %)	O3 (PPM)	PRIMARY BSP-TO (UG/M3) (10-4 M
H+2S											
29	0.000	0.214	0.079	0.000	36.971	0.000	0.107	0.000	0.000	-0.079	356.702
TOTAL AMB:	5.686	0.220	0.085	2.250	3.442	91.105	0.115	2.250	0.497	0.001	361.952
01	1.395										4.2
H+1S											
10	0.000	0.958	0.082	0.000	8.544	0.000	0.478	0.000	0.000	-0.080	1598.626
TOTAL AMB:	1.395	0.964	0.088	2.250	2.733	70.014	0.486	2.250	0.118	0.000	1603.876
01											17.2
H											
51	0.000	1.579	0.083	0.000	5.272	0.000	0.788	0.000	0.000	-0.080	2635.689
TOTAL AMB:	0.856	1.585	0.089	2.250	2.327	58.672	0.796	2.250	0.072	0.000	2640.939
42											28.0
H-1S											
10	0.000	0.958	0.082	0.000	8.544	0.000	0.478	0.000	0.000	-0.080	1598.626
TOTAL AMB:	1.395	0.964	0.088	2.250	2.733	70.014	0.486	2.250	0.118	0.000	1603.876
01											17.2
H-2S											
29	0.000	0.214	0.079	0.000	36.971	0.000	0.107	0.000	0.000	-0.079	356.702
TOTAL AMB:	5.686	0.220	0.085	2.250	3.442	91.105	0.115	2.250	0.497	0.001	361.952
00	1.395										4.2
0											
00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
TOTAL AMB:	48.859	0.006	0.006	2.250	0.259	99.734	0.008	2.250	6.685	0.080	5.250
91											0.4

CUMULATIVE SURFACE DEPOSITION (MOLE FRACTIONOF INITIAL FLUX

SO2: 0.0000
 NOX: 0.0000
 PRIMARY PARTICULATE: 0.0000
 SO4: 0.0000
 NO3: 0.0000

0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
 Hyperion December

DOWNDOWN DISTANCE (KM) = 1.0
 PLUME ALTITUDE (M) = 148.
 PLUME-OBSERVER DISTANCE (KM) = 13.1
 AZIMUTH OF LINE-OF-SIGHT = 51.0
 ELEVATION ANGLE OF LINE-OF-SIGHT = 0.6
 SOLAR ZENITH ANGLE = 87.9 AT 774. ON 12/21
 SIGHT PATH IS THROUGH PLUME CENTER

THETA (LUV)	ALPHA (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y DELYCAP	DELL	C (550)	BRATIO	DELX	DELY	E
-------------	-------------	--------	----	----------	------	---	---	-----------	------	---------	--------	------	------	---

74.
 .5675 11. 0.20 36.2 44.04 110.01 103.74 0.3715 0.3694 0.94 0.34 0.0139 1.0356 0.0002 0.0020 1
 0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
 Hyperion December

DOWNDOWN DISTANCE (KM) = 1.0
 PLUME ALTITUDE (M) = 148.
 PLUME-OBSERVER DISTANCE (KM) = 13.1
 AZIMUTH OF LINE-OF-SIGHT = 51.0
 ELEVATION ANGLE OF LINE-OF-SIGHT = 0.6
 SOLAR ZENITH ANGLE = 87.9 AT 774. ON 12/21
 SIGHT PATH IS AT GROUND LEVEL

THETA (LUV)	ALPHA E (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y DELYCAP	DELL	C (550)	BRATIO	DELX	DELY	E
-------------	---------------	--------	----	----------	------	---	---	-----------	------	---------	--------	------	------	---

74.
 .0022 11. 0.20 64.6 0.00 109.08 103.40 0.3713 0.3674 0.00 0.00 0.0000 1.0000 0.0000 0.0000 0
 0

CONCENTRATIONS OF AEROSOL AND GASES CONTRIBUTED BY

Hyperion December

DOWNDOWN DISTANCE (KM) = 2.5
 PLUME ALTITUDE (M) = 148.
 SIGMA Y (M) = 89.
 SIGMA Z (M) = 27.
 SO2-SO4 CONVERSION RATE= 0.0000 PERCENT/HR
 NOX-NO3 CONVERSION RATE= 0.0000 PERCENT/HR

ALTITUDE TAL	BSPSN/BSP -1)	NOX (%)	NO2	NO3-	NO2/NTOT	NO3-/NTOT	SO2	SO4=	SO4=/STOT	O3	PRIMARY	BSP-TO
--------------	---------------	---------	-----	------	----------	-----------	-----	------	-----------	----	---------	--------

H+2S INCREMENT: 60 0.000	0.072	0.063	0.000	87.207	0.000	0.036	0.000	0.000	-0.063	120.498	1.2
TOTAL AMB: 51 13.704											

H+1S INCREMENT: 45 0.000	0.324	0.081	0.000	25.046	0.000	0.161	0.000	0.000	-0.079	540.035	5.6
TOTAL AMB: 36 3.910											

H INCREMENT: 07 0.000	0.533	0.084	0.000	15.738	0.000	0.266	0.000	0.000	-0.080	890.367	9.3
TOTAL AMB: 98 2.449											

H-1S INCREMENT: 45 0.000	0.324	0.081	0.000	25.046	0.000	0.161	0.000	0.000	-0.079	540.035	5.6
TOTAL AMB: 36 3.910											

H-2S INCREMENT: 60 0.000	0.072	0.063	0.000	87.207	0.000	0.036	0.000	0.000	-0.063	120.498	1.2
TOTAL AMB: 51 13.704											

0 INCREMENT: 00 0.014	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.001	0.000	0.000	0.0
TOTAL AMB: 91 48.859											

CUMULATIVE SURFACE DEPOSITION (MOLE FRACTIONOF INITIAL FLUX

SO2:	0.0000
NOX:	0.0000
PRIMARY PARTICULATE:	0.0000
SO4:	0.0000

NO3: 0.0000

0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion December

DOWNWIND DISTANCE (KM) = 2.5
 PLUME ALTITUDE (M) = 148.
 PLUME-OBSERVER DISTANCE (KM) = 11.6
 AZIMUTH OF LINE-OF-SIGHT = 52.4
 ELEVATION ANGLE OF LINE-OF-SIGHT = 0.7
 SOLAR ZENITH ANGLE = 87.9 AT 774. ON 12/21
 SIGHT PATH IS THROUGH PLUME CENTER

THETA (LUV)	ALPHA E (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y	DELYCAP	DELL	C(550)	BRATIO	DELX	DELY	E
-------------	---------------	--------	----	----------	------	---	---	---	---------	------	--------	--------	------	------	---

73.	12.	0.18	47.7	26.18	109.55	103.58	0.3743	0.3705	-0.16	-0.06	0.0021	1.0021	0.0022	0.0029	2
-----	-----	------	------	-------	--------	--------	--------	--------	-------	-------	--------	--------	--------	--------	---

0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion December

DOWNWIND DISTANCE (KM) = 2.5
 PLUME ALTITUDE (M) = 148.
 PLUME-OBSERVER DISTANCE (KM) = 11.6
 AZIMUTH OF LINE-OF-SIGHT = 52.4
 ELEVATION ANGLE OF LINE-OF-SIGHT = 0.7
 SOLAR ZENITH ANGLE = 87.9 AT 774. ON 12/21
 SIGHT PATH IS AT GROUND LEVEL

THETA (LUV)	ALPHA E (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y	DELYCAP	DELL	C(550)	BRATIO	DELX	DELY	E
-------------	---------------	--------	----	----------	------	---	---	---	---------	------	--------	--------	------	------	---

73.	12.	0.18	64.6	0.00	109.72	103.64	0.3721	0.3676	0.00	0.00	0.0000	1.0001	0.0000	0.0000	0
-----	-----	------	------	------	--------	--------	--------	--------	------	------	--------	--------	--------	--------	---

0

CONCENTRATIONS OF AEROSOL AND GASES CONTRIBUTED BY

Hyperion December

DOWNWIND DISTANCE (KM) = 5.0
 PLUME ALTITUDE (M) = 148.
 SIGMA Y (M) = 156.
 SIGMA Z (M) = 35.
 SO2-SO4 CONVERSION RATE= 0.0000 PERCENT/HR
 NOX-NO3 CONVERSION RATE= 0.0000 PERCENT/HR

ALTITUDE TAL	BPSN/BSP	NOX (%)	NO2 (PPM)	NO3- (PPM)	NO2/NTOT (MOLE %)	NO3-/NTOT (MOLE %)	SO2 (PPM)	SO4= (UG/M3)	SO4=/STOT (MOLE %)	O3 (PPM)	PRIMARY (UG/M3)	BSP-TO (10-4 M)
--------------	----------	---------	-----------	------------	-------------------	--------------------	-----------	--------------	--------------------	----------	-----------------	-----------------

H+2S INCREMENT: 38 0.000	0.031	0.029	0.000	94.810	0.000	0.015	0.000	0.000	-0.029	51.477	0.5
TOTAL AMB: 29 23.312	0.037	0.035	2.250	1.541	98.389	0.023	2.250	2.391	0.051	56.727	1.0

H+1S INCREMENT: 12 0.000	0.138	0.078	0.000	56.305	0.000	0.069	0.000	0.000	-0.077	230.703	2.4
TOTAL AMB: 03 8.265	0.144	0.084	2.250	3.501	93.977	0.077	2.250	0.739	0.003	235.953	2.9

H INCREMENT: 76 0.000	0.228	0.081	0.000	35.637	0.000	0.114	0.000	0.000	-0.079	380.365	3.9
TOTAL AMB: 67 5.371	0.234	0.087	2.250	3.511	90.585	0.122	2.250	0.469	0.001	385.615	4.4

H-1S INCREMENT: 12 0.000	0.138	0.078	0.000	56.305	0.000	0.069	0.000	0.000	-0.077	230.703	2.4
TOTAL AMB: 03 8.265	0.144	0.084	2.250	3.501	93.977	0.077	2.250	0.739	0.003	235.953	2.9

H-2S INCREMENT: 38 0.000	0.031	0.029	0.000	94.810	0.000	0.015	0.000	0.000	-0.029	51.477	0.5
TOTAL AMB: 29 23.312	0.037	0.035	2.250	1.541	98.389	0.023	2.250	2.391	0.051	56.727	1.0

0

INCREMENT:	0.000	0.000	0.000	0.000	0.018	0.000	0.000	0.003	0.000	0.123	0.0
01	0.032										
TOTAL AMB:	0.006	0.006	2.250	0.262	99.731	0.008	2.250	6.657	0.080	5.373	0.4
92	48.732										

CUMULATIVE SURFACE DEPOSITION (MOLE FRACTIONOF INITIAL FLUX

SO2:	0.0000
NOX:	0.0000
PRIMARY PARTICULATE:	0.0000
SO4:	0.0000
NO3:	0.0000

0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion December

DOWNWIND DISTANCE (KM) = 5.0
PLUME ALTITUDE (M) = 148.
PLUME-OBSERVER DISTANCE (KM) = 9.2
AZIMUTH OF LINE-OF-SIGHT = 55.7
ELEVATION ANGLE OF LINE-OF-SIGHT = 0.9
SOLAR ZENITH ANGLE = 87.9 AT 774. ON 12/21
SIGHT PATH IS THROUGH PLUME CENTER

THETA (LUV)	ALPHA E (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y	DELYCAP	DELL	C (550)	BRATIO	DELX	DELY	E
-------------	---------------	--------	----	----------	------	---	---	---	---------	------	---------	--------	------	------	---

69.	16.	0.14	54.4	15.86	110.30	103.85	0.3783	0.3722	-1.17	-0.42	-0.0080	0.9660	0.0040	0.0041	3
.5516	2.7975														

0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion December

DOWNWIND DISTANCE (KM) = 5.0
PLUME ALTITUDE (M) = 148.
PLUME-OBSERVER DISTANCE (KM) = 9.2
AZIMUTH OF LINE-OF-SIGHT = 55.7
ELEVATION ANGLE OF LINE-OF-SIGHT = 0.9
SOLAR ZENITH ANGLE = 87.9 AT 774. ON 12/21
SIGHT PATH IS AT GROUND LEVEL

THETA (LUV)	ALPHA E (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y	DELYCAP	DELL	C (550)	BRATIO	DELX	DELY	E
-------------	---------------	--------	----	----------	------	---	---	---	---------	------	---------	--------	------	------	---

69.	16.	0.14	64.6	0.01	111.47	104.27	0.3742	0.3682	0.00	0.00	0.0000	1.0001	0.0000	0.0000	0
.0047	0.0033														

0

CONCENTRATIONS OF AEROSOL AND GASES CONTRIBUTED BY

Hyperion December

DOWNWIND DISTANCE (KM) = 10.0
PLUME ALTITUDE (M) = 148.
SIGMA Y (M) = 281.
SIGMA Z (M) = 47.
SO2-SO4 CONVERSION RATE= 0.0000 PERCENT/HR
NOX-NO3 CONVERSION RATE= 0.0000 PERCENT/HR

ALTITUDE TAL	BSPSN/BSP	NOX (%)	NO2 (PPM)	NO3- (PPM)	NO2/NTOT (MOLE %)	NO3-/NTOT (MOLE %)	SO2 (PPM)	SO4-= (UG/M3)	SO4=/STOT (MOLE %)	O3 (PPM)	PRIMARY (10-4 M)
-1		(%)									

H+2S											
INCREMENT:	0.013	0.012	0.000	95.165	0.003	0.006	0.000	0.000	-0.012	21.555	0.2
25	0.005										
TOTAL AMB:	0.019	0.018	2.250	0.806	99.166	0.014	2.250	3.816	0.068	26.805	0.7
16	33.492										

H+1S											
INCREMENT:	0.058	0.053	0.000	91.458	0.000	0.029	0.000	0.000	-0.052	96.604	1.0
10	0.000										
TOTAL AMB:	0.064	0.059	2.250	2.547	97.240	0.037	2.250	1.530	0.028	101.854	1.5
01	15.985										

H											
INCREMENT:	0.095	0.073	0.000	76.597	0.000	0.048	0.000	0.000	-0.072	159.273	1.6
65	0.000										

TOTAL AMB:	0.101	0.079	2.250	3.363	95.687	0.056	2.250	1.020	0.008	164.523	2.1
56	11.128										
H-1S											
INCREMENT:	0.058	0.053	0.000	91.458	0.000	0.029	0.000	0.000	-0.052	96.604	1.0
10	0.000										
H-2S											
INCREMENT:	0.013	0.012	0.000	95.165	0.003	0.006	0.000	0.000	-0.012	21.572	0.2
25	0.005										
TOTAL AMB:											
01	15.985										
17 33.484											
0											
INCREMENT:	0.001	0.001	0.000	84.617	0.036	0.001	0.000	0.005	-0.001	2.280	0.0
24	0.063										
TOTAL AMB:											
15	46.599										

CUMULATIVE SURFACE DEPOSITION (MOLE FRACTIONOF INITIAL FLUX

SO2:	0.0000
NOX:	0.0000
PRIMARY PARTICULATE:	0.0000
SO4:	0.0000
NO3:	0.0000

0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion December

DOWNWIND DISTANCE (KM) = 10.0
PLUME ALTITUDE (M) = 148.
PLUME-OBSERVER DISTANCE (KM) = 4.6
AZIMUTH OF LINE-OF-SIGHT = 73.0
ELEVATION ANGLE OF LINE-OF-SIGHT = 1.9
SOLAR ZENITH ANGLE = 87.9 AT 774. ON 12/21
SIGHT PATH IS THROUGH PLUME CENTER

THETA (LUV)	ALPHA (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y	DELYCAP	DELL	C(550)	BRATIO	DELX	DELY	E
-------------	-------------	--------	----	----------	------	---	---	---	---------	------	--------	--------	------	------	---

52.	33.	0.07	60.7	6.06	122.38	108.07	0.3940	0.3762	-1.53	-0.52	-0.0111	0.9335	0.0049	0.0045	4
-----	-----	------	------	------	--------	--------	--------	--------	-------	-------	---------	--------	--------	--------	---

.2204	3.3895
-------	--------

0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion December

DOWNWIND DISTANCE (KM) = 10.0
PLUME ALTITUDE (M) = 148.
PLUME-OBSERVER DISTANCE (KM) = 4.6
AZIMUTH OF LINE-OF-SIGHT = 73.0
ELEVATION ANGLE OF LINE-OF-SIGHT = 1.9
SOLAR ZENITH ANGLE = 87.9 AT 774. ON 12/21
SIGHT PATH IS AT GROUND LEVEL

THETA (LUV)	ALPHA (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y	DELYCAP	DELL	C(550)	BRATIO	DELX	DELY	E
-------------	-------------	--------	----	----------	------	---	---	---	---------	------	--------	--------	------	------	---

52.	33.	0.07	64.6	0.09	123.89	108.58	0.3892	0.3718	-0.02	-0.01	-0.0002	0.9989	0.0001	0.0001	0
-----	-----	------	------	------	--------	--------	--------	--------	-------	-------	---------	--------	--------	--------	---

0

CONCENTRATIONS OF AEROSOL AND GASES CONTRIBUTED BY

Hyperion December

DOWNWIND DISTANCE (KM) = 13.0
PLUME ALTITUDE (M) = 148.
SIGMA Y (M) = 352.
SIGMA Z (M) = 52.
SO2-SO4 CONVERSION RATE= 0.0000 PERCENT/HR
NOX-NO3 CONVERSION RATE= 0.0003 PERCENT/HR

ALTITUDE TAL	NOX BSPSN/BSP	NO2	NO3-	NO2/NTOT	NO3-/NTOT	SO2	SO4=	SO4=/STOT	O3	PRIMARY BSP-TO
--------------	---------------	-----	------	----------	-----------	-----	------	-----------	----	----------------

		(PPM)	(PPM)	(PPM)	(MOLE %)	(MOLE %)	(PPM)	(UG/M3)	(MOLE %)	(PPM)	(UG/M3)	(10-4 M)
-1)	(%)											
H+2S INCREMENT: 62 0.009 TOTAL AMB: 53 36.745	0.009	0.009	0.000	94.735	0.005	0.005	0.000	0.001	-0.009	15.489	0.1	
H+1S INCREMENT: 26 0.001 TOTAL AMB: 17 19.719	0.042	0.039	0.000	93.852	0.000	0.021	0.000	0.000	-0.039	69.417	0.7	
H INCREMENT: 96 0.000 TOTAL AMB: 87 14.218	0.069	0.061	0.000	88.706	0.000	0.034	0.000	0.000	-0.060	114.449	1.1	
H-1S INCREMENT: 26 0.001 TOTAL AMB: 17 19.719	0.042	0.039	0.000	93.852	0.000	0.021	0.000	0.000	-0.039	69.419	0.7	
H-2S INCREMENT: 63 0.009 TOTAL AMB: 54 36.662	0.009	0.009	0.000	94.747	0.005	0.005	0.000	0.001	-0.009	15.631	0.1	
0 INCREMENT: 44 0.040 TOTAL AMB: 35 44.868	0.003	0.002	0.000	90.093	0.023	0.001	0.000	0.003	-0.002	4.181	0.0	

CUMULATIVE SURFACE DEPOSITION (MOLE FRACTIONOF INITIAL FLUX

SO2: 0.0009
NOX: 0.0009
PRIMARY PARTICULATE: 0.0001
SO4: 0.0000
NO3: 0.0000

0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion December

DOWNDOWN DISTANCE (KM) = 13.0
PLUME ALTITUDE (M) = 148.
PLUME-OBSERVER DISTANCE (KM) = 2.6
AZIMUTH OF LINE-OF-SIGHT = 111.4
ELEVATION ANGLE OF LINE-OF-SIGHT = 3.2
SOLAR ZENITH ANGLE = 87.9 AT 774. ON 12/21
SIGHT PATH IS THROUGH PLUME CENTER

THETA (LUV)	ALPHA E (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y DELYCAP	DELL	C (550)	BRATIO	DELX	DELY	E
14. .6846	71. 4.7581	0.04	62.3	3.62	192.74	128.33	0.4514	0.3856	3.62	0.91	0.0122	0.8948	0.0062	0.0027 6

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion December

DOWNDOWN DISTANCE (KM) = 13.0
PLUME ALTITUDE (M) = 148.
PLUME-OBSERVER DISTANCE (KM) = 2.6
AZIMUTH OF LINE-OF-SIGHT = 111.4
ELEVATION ANGLE OF LINE-OF-SIGHT = 3.2
SOLAR ZENITH ANGLE = 87.9 AT 774. ON 12/21
SIGHT PATH IS AT GROUND LEVEL

THETA (LUV)	ALPHA E (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y DELYCAP	DELL	C (550)	BRATIO	DELX	DELY	E
-------------	---------------	--------	----	----------	------	---	---	-----------	------	---------	--------	------	------	---

14.

71.	0.04	64.6	0.13	189.27	127.46	0.4454	0.3830	0.14	0.04	0.0005	0.9957	0.0002	0.0001	0
-----	------	------	------	--------	--------	--------	--------	------	------	--------	--------	--------	--------	---

.2601 0.1842

0 HISTORY OF PLUME PARCEL AT DOWNDOWN DISTANCE = 1.0 KM

PARCEL AGE (HR)	LOCAL TIME	SO2-TO-SO4= CONVERSION RATE (%/HR)						NOX-TO-HNO3 CONVERSION RATE (%/HR)						
		H+2S	H+1S	H	H-1S	H-2S	0	H+2S	H+1S	H	H-1S	H-2S	0	
0.1	814	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0

0 HISTORY OF PLUME PARCEL AT DOWNDOWN DISTANCE = 2.5 KM

PARCEL AGE (HR)	LOCAL TIME	SO2-TO-SO4= CONVERSION RATE (%/HR)						NOX-TO-HNO3 CONVERSION RATE (%/HR)						
		H+2S	H+1S	H	H-1S	H-2S	0	H+2S	H+1S	H	H-1S	H-2S	0	
0.1	802	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
0.3	814	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.04	0

0 HISTORY OF PLUME PARCEL AT DOWNDOWN DISTANCE = 5.0 KM

PARCEL AGE (HR)	LOCAL TIME	SO2-TO-SO4= CONVERSION RATE (%/HR)						NOX-TO-HNO3 CONVERSION RATE (%/HR)						
		H+2S	H+1S	H	H-1S	H-2S	0	H+2S	H+1S	H	H-1S	H-2S	0	
0.1	743	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
0.3	755	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0
0.6	814	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.04	0

0 HISTORY OF PLUME PARCEL AT DOWNDOWN DISTANCE = 10.0 KM

PARCEL AGE (HR)	LOCAL TIME	SO2-TO-SO4= CONVERSION RATE (%/HR)						NOX-TO-HNO3 CONVERSION RATE (%/HR)						
		H+2S	H+1S	H	H-1S	H-2S	0	H+2S	H+1S	H	H-1S	H-2S	0	
0.1	706	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
0.3	717	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0
0.6	736	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0
1.3	814	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.04	0

0 HISTORY OF PLUME PARCEL AT DOWNDOWN DISTANCE = 13.0 KM

PARCEL AGE (HR)	LOCAL TIME	SO2-TO-SO4= CONVERSION RATE (%/HR)						NOX-TO-HNO3 CONVERSION RATE (%/HR)						
		H+2S	H+1S	H	H-1S	H-2S	0	H+2S	H+1S	H	H-1S	H-2S	0	
0.1	643	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
0.3	654	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
0.6	713	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0
1.3	751	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0
1.6	814	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.04	0

1 PLOT FILE VERIFICATION

0 OBSERVER-BASED DATA

0 SKY BACKGROUND

0 For ground level if calculations done for both plume centerline and ground level.

0 NX 1 2 3 4 5

0 DISTANCE (KM) 1. 3. 5. 10. 13.

0 REDUCTION OF VISUAL

0 RANGE (%) 0.000 0.000 0.005 0.087 0.133

0 BLUE-RED RATIO

0 1.000 1.000 1.000 0.999 0.996

0 PLUME CONTRAST AT

0 0.55 MICRONS 0.000 0.000 0.000 0.000 0.000

0 OPLUME PERCEPITABILITY

0 DELTA E(L*A*B*) 0.002 0.003 0.003 0.055 0.184

0 WHITE BACKGROUND

0 NX 1 2 3 4 5

0 DISTANCE (KM) 1. 3. 5. 10. 13.

0 REDUCTION OF VISUAL

0 RANGE (%) 0.000 0.000 0.000 0.000 0.000

0 BLUE-RED RATIO

0 0.000 0.000 0.000 0.000 0.000

0 PLUME CONTRAST AT

0 0.55 MICRONS

EYE ACCOMODATED TO					
BACKGROUND	0.000	0.000	0.000	0.000	0.000
EYE ACCOMODATED TO					
SKY	0.000	0.000	0.000	0.000	0.000
OPLUME PERCEPTIBILITY					
DELTA E (L*A*B*)	0.000	0.000	0.000	0.000	0.000
0 GRAY BACKGROUND					
NX	1	2	3	4	5
0 DISTANCE (KM)	1.	3.	5.	10.	13.
0 REDUCTION OF VISUAL					
RANGE (%)	0.000	0.000	0.000	0.000	0.000
0 BLUE-RED RATIO					
	0.000	0.000	0.000	0.000	0.000
0 PLUME CONTRAST AT					
0.55 MICRONS					
EYE ACCOMODATED TO					
BACKGROUND	0.000	0.000	0.000	0.000	0.000
EYE ACCOMODATED TO					
SKY	0.000	0.000	0.000	0.000	0.000
OPLUME PERCEPTIBILITY					
DELTA E (L*A*B*)	0.000	0.000	0.000	0.000	0.000
1 BLACK BACKGROUND					
NX	1	2	3	4	5
0 DISTANCE (KM)	1.	3.	5.	10.	13.
0 REDUCTION OF VISUAL					
RANGE (%)	0.000	0.000	0.000	0.000	0.000
0 BLUE-RED RATIO					
	0.000	0.000	0.000	0.000	0.000
0 PLUME CONTRAST AT					
0.55 MICRONS					
EYE ACCOMODATED TO					
BACKGROUND	0.000	0.000	0.000	0.000	0.000
EYE ACCOMODATED TO					
SKY	0.000	0.000	0.000	0.000	0.000
OPLUME PERCEPTIBILITY					
DELTA E (L*A*B*)	0.000	0.000	0.000	0.000	0.000

1
 PLUVUE II (VERSION 96170)
 AN AIR QUALITY DISPERSION MODEL IN
 THE OTHER MODELS SECTION
 EPA SUPPORT CENTER FOR REGULATORY AIR MODELS

0
 VISUAL IMPACT ASSESSMENT FOR Hyperion March

EMISSIONS SOURCE DATA

ELEVATION OF SITE = 1220. FEET MSL
 372. METERS MSL

NO. OF UNITS = 1.

STACK HEIGHT = 160. FEET
 49. METERS

FLUE GAS FLOW RATE = 168757. CU FT/MIN
 79.63 CU M/SEC

FLUE GAS TEMPERATURE = 426. F
 492. K

FLUE GAS OXYGEN CONTENT = 3.0 MOL PERCENT

SO2 EMISSION RATE (TOTAL) = 2.34 TONS/DAY
 2.457E+01 G/SEC

NOX EMISSION RATE (TOTAL, AS NO2) = 3.37 TONS/DAY
 3.538E+01 G/SEC

PARTICULATE EMISSION RATE (TOTAL) = 2.99 TONS/DAY
 3.140E+01 G/SEC

0

METEOROLOGICAL AND AMBIENT AIR QUALITY DATA

WINDSPEED = 2.2 MILES/HR
 1.0 M/SEC

PASQUILL-GIFFORD-TURNER STABILITY CATEGORY F

LAPSE RATE = 13.82 F/1000 FT
 2.519E-02 K/M

POTENTIAL TEMPERATURE LAPSE RATE = 3.499E-02 K/M

AMBIENT TEMPERATURE = 32.0 F
 273.2 K

RELATIVE HUMIDITY = 78.0 %

MIXING DEPTH = 0.0 M

AMBIENT PRESSURE = 0.96 ATM

BACKGROUND NOX CONCENTRATION = 0.006 PPM

BACKGROUND NO2 CONCENTRATION = 0.006 PPM

BACKGROUND OZONE CONCENTRATION = 0.080 PPM

BACKGROUND SO2 CONCENTRATION = 0.008 PPM

ROG = 0.1500 SIGMA = 2.0000 REFRACTIVE INDEX = 1.5000 + 0.000000
 LOG-NORMAL SIZE DISTRIBUTION (101 POINT HISTOGRAM)
 ROG = 3.0000 SIGMA = 2.2000 REFRACTIVE INDEX = 1.5000 + 0.000000
 LOG-NORMAL SIZE DISTRIBUTION (101 POINT HISTOGRAM)
 ROG = 1.0000 SIGMA = 2.0000 REFRACTIVE INDEX = 1.5000 + 0.000000
 LOG-NORMAL SIZE DISTRIBUTION (101 POINT HISTOGRAM)
 ROG = 0.0500 SIGMA = 2.0000 REFRACTIVE INDEX = 2.0000 + 1.000000
 LOG-NORMAL SIZE DISTRIBUTION (101 POINT HISTOGRAM)

BACKGROUND COARSE MODE CONCENTRATION = 3.0 UG/M3

BACKGROUND SULFATE CONCENTRATION = 2.3 UG/M3

BACKGROUND NITRATE CONCENTRATION = 2.3 UG/M3

BACKGROUND VISUAL RANGE = 59.8 KILOMETERS
 SO2 DEPOSITION VELOCITY = 1.00 CM/SEC
 NOX DEPOSITION VELOCITY = 1.00 CM/SEC
 COARSE PARTICULATE DEPOSITION VELOCITY = 0.10 CM/SEC
 SUBMICRON PARTICULATE DEPOSITION VELOCITY = 0.10 CM/SEC

AEROSOL STATISTICS

	BACKGROUND	PLUME	CARBONACEOUS AEROSOLS		
MASS MEDIAN RADIUS MICROMETERS	ACCUMULATION MODE	COARSE MODE	ACCUMULATION MODE	COARSE MODE	CARBONACEOUS AEROSOLS
	0.150	3.000	0.100	1.000	0.050
GEOMETRIC STANDARD DEVIATION	2.000	2.200	2.000	2.000	2.000
PARTICLE DENSITY G/ (CM**3)	1.500	2.500	1.500	2.500	2.000

CARBONACEOUS FRACTION OF PARTICULATE MASS EMISSIONS = 0.000

BACKGROUND ATMOSPHERIC ELEMENTAL CARBON = 0.020 UG/M**3

0

GEOMETRY OF USER-SPECIFIED PLUME-OBSERVER-SUN ORIENTATION

WIND DIRECTION (DEGREES) = 40.0

SIMULATION IS FOR 729. HOURS ON 3/21

SOLAR ZENITH ANGLE (DEGREES) = 80.0

SOLAR AZIMUTH ANGLE (DEGREES) = 99.3

GEOMETRIES FOR LINES-OF-SIGHT THROUGH PLUME PARCELS AT GIVEN DOWNWIND DISTANCES (X)

X (KM)	AZIMUTH	RP	ALPHA	BETA	THETA
1.0	51.0	13.1	11.0	0.6	49.0
2.5	52.4	11.6	12.4	0.7	47.6
5.0	55.7	9.2	15.7	0.9	44.3
10.0	73.0	4.6	33.0	1.9	27.4
13.0	111.4	2.6	71.4	3.2	13.8

1 BACKGROUND CONDITIONS

ACCUMULATION MODE MASS RADIUS	SIGMA	BSCAT.55/MASS	COARSE PARTICLE MODE MASS RADIUS	SIGMA	BSCAT.55/MASS	PRIMARY PARTICLE MODE MASS RADIUS	SIGMA	BSC
AT.55/MASS 0.1500E+00	0.2000E+01	0.1176E-01	0.3000E+01	0.2200E+01	0.3219E-03	0.1000E+01	0.2000E+01	
0.1045E-02								

REFRACTION INDEXES

ACCUMULATION MODE = 0.1500E+01 + I 0.0000E+00
 COARSE MODE = 0.1500E+01 + I 0.0000E+00
 PRIMARY AEROSOLS = 0.1500E+01 + I 0.0000E+00
 CARBONACEOUS AEROSOLS = 0.2000E+01 + I 0.1000E+01

COEFFICIENTS AT 0.55 MICROMETERS , 1./KM
 BTARAY = 0.1119E-01 BTAER = 0.5403E-01 ABSNO2 = 0.1802E-02 BTABAC = 0.6539E-01

0

CONCENTRATIONS OF AEROSOL AND GASES CONTRIBUTED BY

Hyperion March

DOWNDOWN DISTANCE (KM) = 1.0
 PLUME ALTITUDE (M) = 148.
 SIGMA Y (M) = 46.
 SIGMA Z (M) = 17.
 SO2-SO4 CONVERSION RATE= 0.0000 PERCENT/HR
 NOX-NO3 CONVERSION RATE= 0.0000 PERCENT/HR

ALTITUDE TAL -1)	BSPSN/BSP (%)	NOX (PPM)	NO2 (PPM)	NO3- (PPM)	NO2/NTOT (MOLE %)	NO3-/NTOT (MOLE %)	SO2 (PPM)	SO4= (UG/M3)	SO4=/STOT (MOLE %)	O3 (PPM)	PRIMARY (UG/M3)	BSP-TO (10-4 M)
H+2S INCREMENT: 40 0.000	0.220	0.076	0.000	34.763	0.000	0.110	0.000	0.000	-0.076	367.323	3.8	
TOTAL AMB: 80 6.040												
H+1S INCREMENT: 08 0.000	0.986	0.081	0.000	8.258	0.000	0.492	0.000	0.000	-0.079	1646.227	17.2	
TOTAL AMB: 48 1.491												
H INCREMENT: 71 0.000	1.626	0.083	0.000	5.110	0.000	0.812	0.000	0.000	-0.080	2714.170	28.3	
TOTAL AMB: 11 0.915												
H-1S INCREMENT: 08 0.000	0.986	0.081	0.000	8.258	0.000	0.492	0.000	0.000	-0.079	1646.227	17.2	
TOTAL AMB: 48 1.491												
H-2S INCREMENT: 40 0.000	0.220	0.076	0.000	34.763	0.000	0.110	0.000	0.000	-0.076	367.323	3.8	
TOTAL AMB: 80 6.040												
0 INCREMENT: 00 0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	
TOTAL AMB: 40 48.963												

CUMULATIVE SURFACE DEPOSITION (MOLE FRACTIONOF INITIAL FLUX

SO2: 0.0000
 NOX: 0.0000
 PRIMARY PARTICULATE: 0.0000
 SO4: 0.0000
 NO3: 0.0000

0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion March

DOWNDOWN DISTANCE (KM) = 1.0
 PLUME ALTITUDE (M) = 148.
 PLUME-OBSERVER DISTANCE (KM) = 13.1
 AZIMUTH OF LINE-OF-SIGHT = 51.0
 ELEVATION ANGLE OF LINE-OF-SIGHT = 0.6
 SOLAR ZENITH ANGLE = 80.0 AT 729. ON 3/21
 SIGHT PATH IS THROUGH PLUME CENTER

THETA (LUV)	ALPHA E(LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y DELYCAP	DELL	C(550)	BRATIO	DELX	DELY	E
49. .7180	11. 1.9483	0.22	33.4	44.23	108.17	103.07	0.3775	0.3799	-3.41	-1.24	-0.0258	1.0595	-0.0029	-0.0006 2
0														

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion March

DOWNDOWN DISTANCE (KM) = 1.0
 PLUME ALTITUDE (M) = 148.
 PLUME-OBSERVER DISTANCE (KM) = 13.1
 AZIMUTH OF LINE-OF-SIGHT = 51.0
 ELEVATION ANGLE OF LINE-OF-SIGHT = 0.6
 SOLAR ZENITH ANGLE = 80.0 AT 729. ON 3/21
 SIGHT PATH IS AT GROUND LEVEL

THETA (LUV)	ALPHA E (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y	DELYCAP	DELL	C (550)	BRATIO	DELX	DELY	E
49.	11.	0.22	59.8	0.00	111.58	104.31	0.3804	0.3805	0.00	0.00	0.0000	1.0001	0.0000	0.0000	0
.0034	0.0026														
0															

CONCENTRATIONS OF AEROSOL AND GASES CONTRIBUTED BY

Hyperion March

DOWNDOWN DISTANCE (KM) = 2.5
 PLUME ALTITUDE (M) = 148.
 SIGMA Y (M) = 89.
 SIGMA Z (M) = 27.
 SO2-SO4 CONVERSION RATE= 0.0000 PERCENT/HR
 NOX-NO3 CONVERSION RATE= 0.0001 PERCENT/HR

ALTITUDE TAL	BSPSN/BSP	NOX (%)	NO2 (PPM)	NO3- (PPM)	NO2/NTOT (MOLE %)	NO3-/NTOT (MOLE %)	SO2 (PPM)	SO4= (UG/M3)	SO4=/STOT (MOLE %)	O3 (PPM)	PRIMARY (UG/M3)	BSP-TO (10-4 M)
-1)	(%)											
H+2S INCREMENT: 96 0.000	0.074	0.056	0.000	75.881	0.000	0.037	0.000	0.000	-0.056	123.939	1.2	
TOTAL AMB: 36 14.411	0.080	0.062	2.250	2.667	96.556	0.045	2.250	1.256	0.024	129.189	1.8	
H+1S INCREMENT: 06 0.000	0.333	0.080	0.000	23.906	0.000	0.166	0.000	0.000	-0.078	555.459	5.8	
TOTAL AMB: 46 4.169	0.339	0.085	2.250	3.297	86.915	0.174	2.250	0.328	0.002	560.709	6.3	
H INCREMENT: 73 0.000	0.549	0.083	0.000	15.154	0.000	0.274	0.000	0.000	-0.079	915.796	9.5	
TOTAL AMB: 13 2.616	0.555	0.089	2.250	3.172	80.225	0.282	2.250	0.203	0.001	921.046	10.1	
H-1S INCREMENT: 06 0.000	0.333	0.080	0.000	23.906	0.000	0.166	0.000	0.000	-0.078	555.459	5.8	
TOTAL AMB: 46 4.169	0.339	0.085	2.250	3.297	86.915	0.174	2.250	0.328	0.002	560.709	6.3	
H-2S INCREMENT: 96 0.000	0.074	0.056	0.000	75.881	0.000	0.037	0.000	0.000	-0.056	123.940	1.2	
TOTAL AMB: 36 14.411	0.080	0.062	2.250	2.667	96.556	0.045	2.250	1.256	0.024	129.190	1.8	
0 INCREMENT: 00 0.168	0.000	0.000	0.000	0.000	0.082	0.000	0.000	0.013	0.000	0.000	0.0	
TOTAL AMB: 40 48.963	0.006	0.006	2.250	0.245	99.734	0.008	2.250	6.685	0.080	5.250	0.5	

CUMULATIVE SURFACE DEPOSITION (MOLE FRACTION OF INITIAL FLUX

SO2:	0.0000
NOX:	0.0000
PRIMARY PARTICULATE:	0.0000
SO4:	0.0000
NO3:	0.0000

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion March

DOWNDOWN DISTANCE (KM) = 2.5
 PLUME ALTITUDE (M) = 148.
 PLUME-OBSERVER DISTANCE (KM) = 11.6
 AZIMUTH OF LINE-OF-SIGHT = 52.4
 ELEVATION ANGLE OF LINE-OF-SIGHT = 0.7
 SOLAR ZENITH ANGLE = 80.0 AT 729. ON 3/21
 SIGHT PATH IS THROUGH PLUME CENTER

THETA (LUV)	ALPHA E (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y DELYCAP	DELL	C(550)	BRATIO	DELX	DELY	E		
48.																
.6350	1.4607	12.	0.19	44.3	25.98	111.34	104.22	0.3810	0.3818	-3.81	-1.36	-0.0298	1.0236	-0.0007	0.0005	1
0																

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
 Hyperion March

DOWNDOWN DISTANCE (KM) = 2.5
 PLUME ALTITUDE (M) = 148.
 PLUME-OBSERVER DISTANCE (KM) = 11.6
 AZIMUTH OF LINE-OF-SIGHT = 52.4
 ELEVATION ANGLE OF LINE-OF-SIGHT = 0.7
 SOLAR ZENITH ANGLE = 80.0 AT 729. ON 3/21
 SIGHT PATH IS AT GROUND LEVEL

THETA (LUV)	ALPHA E (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y DELYCAP	DELL	C(550)	BRATIO	DELX	DELY	E		
48.																
.0069	0.0053	12.	0.19	59.8	0.00	115.16	105.58	0.3817	0.3813	0.00	0.00	0.0000	1.0001	0.0000	0.0000	0
0																

CONCENTRATIONS OF AEROSOL AND GASES CONTRIBUTED BY
 Hyperion March

DOWNDOWN DISTANCE (KM) = 5.0
 PLUME ALTITUDE (M) = 148.
 SIGMA Y (M) = 156.
 SIGMA Z (M) = 35.
 SO2-SO4 CONVERSION RATE= 0.0000 PERCENT/HR
 NOX-NO3 CONVERSION RATE= 0.0003 PERCENT/HR

ALTITUDE TAL	BSPSN/BSP	NOX	NO2	NO3-	NO2/NTOT	NO3-/NTOT	SO2	SO4=	SO4=/STOT	O3	PRIMARY BSP-TO
-1)	(%)	(PPM)	(PPM)	(PPM)	(MOLE %)	(MOLE %)	(PPM)	(UG/M3)	(MOLE %)	(PPM)	(UG/M3) (10-4 M
H+2S											
INCREMENT:	53 0.007	0.032	0.027	0.000	86.711	0.003	0.016	0.000	0.001	-0.027	52.921 0.5
TOTAL AMB:	94 24.196	0.038	0.033	2.250	1.456	98.352	0.024	2.250	2.349	0.053	58.171 1.0
H+1S											
INCREMENT:	79 0.000	0.142	0.073	0.000	51.456	0.000	0.071	0.000	0.000	-0.072	237.177 2.4
TOTAL AMB:	20 8.762	0.148	0.079	2.250	3.291	93.825	0.079	2.250	0.721	0.008	242.427 3.0
H											
INCREMENT:	87 0.000	0.234	0.079	0.000	33.651	0.000	0.117	0.000	0.000	-0.076	391.039 4.0
TOTAL AMB:	28 5.717	0.240	0.085	2.250	3.399	90.352	0.125	2.250	0.457	0.004	396.289 4.6
H-1S											
INCREMENT:	79 0.000	0.142	0.073	0.000	51.456	0.000	0.071	0.000	0.000	-0.072	237.177 2.4
TOTAL AMB:	20 8.762	0.148	0.079	2.250	3.291	93.825	0.079	2.250	0.721	0.008	242.427 3.0
H-2S											
INCREMENT:	53 0.007	0.032	0.027	0.000	86.711	0.003	0.016	0.000	0.001	-0.027	52.921 0.5
TOTAL AMB:	94 24.196	0.038	0.033	2.250	1.456	98.352	0.024	2.250	2.349	0.053	58.171 1.0
0											
INCREMENT:	01 0.405	0.000	0.000	0.000	0.000	0.199	0.000	0.000	0.031	0.000	0.129 0.0
TOTAL AMB:	42 48.842	0.006	0.006	2.250	0.248	99.731	0.008	2.250	6.656	0.080	5.379 0.5

CUMULATIVE SURFACE DEPOSITION (MOLE FRACTION OF INITIAL FLUX)

SO2: 0.0000
 NOX: 0.0000
 PRIMARY PARTICULATE: 0.0000
 SO4: 0.0000
 NO3: 0.0000

0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion March

DOWNDOWN DISTANCE (KM) = 5.0
 PLUME ALTITUDE (M) = 148.
 PLUME-OBSERVER DISTANCE (KM) = 9.2
 AZIMUTH OF LINE-OF-SIGHT = 55.7
 ELEVATION ANGLE OF LINE-OF-SIGHT = 0.9
 SOLAR ZENITH ANGLE = 80.0 AT 729. ON 3/21
 SIGHT PATH IS THROUGH PLUME CENTER

THETA (LUV)	ALPHA E (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y DELYCAP	DELL	C(550)	BRATIO	DELX	DELY	E
-------------	---------------	--------	----	----------	------	---	---	-----------	------	--------	--------	------	------	---

44.	16.	0.15	50.5	15.52	120.23	107.34	0.3864	0.3850	-4.36	-1.47	-0.0339	0.9837	0.0019	0.0018	2
.0987	1.9720														

0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion March

DOWNDOWN DISTANCE (KM) = 5.0
 PLUME ALTITUDE (M) = 148.
 PLUME-OBSERVER DISTANCE (KM) = 9.2
 AZIMUTH OF LINE-OF-SIGHT = 55.7
 ELEVATION ANGLE OF LINE-OF-SIGHT = 0.9
 SOLAR ZENITH ANGLE = 80.0 AT 729. ON 3/21
 SIGHT PATH IS AT GROUND LEVEL

THETA (LUV)	ALPHA E (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y DELYCAP	DELL	C(550)	BRATIO	DELX	DELY	E
-------------	---------------	--------	----	----------	------	---	---	-----------	------	--------	--------	------	------	---

44.	16.	0.15	59.8	0.00	124.59	108.81	0.3846	0.3832	0.01	0.00	0.0000	1.0002	0.0000	0.0000	0
.0102	0.0078														

0

CONCENTRATIONS OF AEROSOL AND GASES CONTRIBUTED BY
Hyperion March

DOWNDOWN DISTANCE (KM) = 10.0
 PLUME ALTITUDE (M) = 148.
 SIGMA Y (M) = 281.
 SIGMA Z (M) = 47.
 SO2-SO4 CONVERSION RATE= 0.0002 PERCENT/HR
 NOX-NO3 CONVERSION RATE= 0.0012 PERCENT/HR

ALTITUDE TAL	BSPSN/BSP	NOX (PPM)	NO2 (PPM)	NO3- (PPM)	NO2/NTOT (MOLE %)	NO3-/NTOT (MOLE %)	SO2 (PPM)	SO4-= (UG/M3)	SO4-=/STOT (MOLE %)	O3 (PPM)	PRIMARY (UG/M3)	BSP-TO (10-4 M)
--------------	-----------	-----------	-----------	------------	-------------------	--------------------	-----------	---------------	---------------------	----------	-----------------	-----------------

H+2S													
INCREMENT:	32	0.061	0.013	0.012	0.000	87.983	0.028	0.007	0.001	0.005	-0.012	22.155	0.2
TOTAL AMB:	72	34.286	0.019	0.017	2.250	0.771	99.151	0.015	2.251	3.773	0.068	27.405	0.7

H+1S													
INCREMENT:	38	0.004	0.059	0.048	0.000	80.869	0.001	0.030	0.000	0.000	-0.048	99.290	1.0
TOTAL AMB:	78	16.765	0.065	0.054	2.250	2.328	97.172	0.038	2.250	1.498	0.032	104.540	1.5

H													
INCREMENT:	11	0.002	0.098	0.066	0.000	67.191	0.000	0.049	0.000	0.000	-0.065	163.702	1.7
TOTAL AMB:	51	11.751	0.104	0.072	2.250	3.046	95.579	0.057	2.250	0.996	0.015	168.952	2.2

H-1S											
INCREMENT:	0.059	0.048	0.000	80.869	0.001	0.030	0.000	0.000	-0.048	99.290	1.0
38	0.004										
TOTAL AMB:	0.065	0.054	2.250	2.328	97.172	0.038	2.250	1.498	0.032	104.540	1.5
78	16.765										

H-2S											
INCREMENT:	0.013	0.012	0.000	87.983	0.028	0.007	0.001	0.005	-0.012	22.172	0.2
32	0.061										
TOTAL AMB:	0.019	0.017	2.250	0.771	99.150	0.015	2.251	3.772	0.068	27.422	0.7
72	34.278										

0											
INCREMENT:	0.001	0.001	0.000	70.530	0.383	0.001	0.002	0.059	-0.001	2.371	0.0
25	0.775										
TOTAL AMB:	0.007	0.007	2.250	0.302	99.672	0.009	2.252	6.179	0.079	7.621	0.5
65	46.834										

CUMULATIVE SURFACE DEPOSITION (MOLE FRACTIONOF INITIAL FLUX

SO2:	0.0000
NOX:	0.0000
PRIMARY PARTICULATE:	0.0000
SO4:	0.0000
NO3:	0.0000

0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion March

DOWNWIND DISTANCE (KM) = 10.0
PLUME ALTITUDE (M) = 148.
PLUME-OBSERVER DISTANCE (KM) = 4.6
AZIMUTH OF LINE-OF-SIGHT = 73.0
ELEVATION ANGLE OF LINE-OF-SIGHT = 1.9
SOLAR ZENITH ANGLE = 80.0 AT 729. ON 3/21
SIGHT PATH IS THROUGH PLUME CENTER

THETA (LUV)	ALPHA (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y DELYCAP	DELL	C(550)	BRATIO	DELX	DELY	E
-------------	-------------	--------	----	----------	------	---	---	-----------	------	--------	--------	------	------	---

27.	33.	0.08	56.3	5.93	194.80	128.84	0.4012	0.3945	-3.23	-0.79	-0.0189	0.9231	0.0047	0.0029	4
.3950	3.4880														

0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion March

DOWNWIND DISTANCE (KM) = 10.0
PLUME ALTITUDE (M) = 148.
PLUME-OBSERVER DISTANCE (KM) = 4.6
AZIMUTH OF LINE-OF-SIGHT = 73.0
ELEVATION ANGLE OF LINE-OF-SIGHT = 1.9
SOLAR ZENITH ANGLE = 80.0 AT 729. ON 3/21
SIGHT PATH IS AT GROUND LEVEL

THETA (LUV)	ALPHA (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y DELYCAP	DELL	C(550)	BRATIO	DELX	DELY	E
-------------	-------------	--------	----	----------	------	---	---	-----------	------	--------	--------	------	------	---

27.	33.	0.08	59.8	0.09	197.98	129.62	0.3966	0.3917	-0.05	-0.01	-0.0003	0.9988	0.0001	0.0000	0
.0677	0.0537														

0

CONCENTRATIONS OF AEROSOL AND GASES CONTRIBUTED BY
Hyperion March

DOWNWIND DISTANCE (KM) = 13.0
PLUME ALTITUDE (M) = 148.
SIGMA Y (M) = 351.
SIGMA Z (M) = 52.
SO2-SO4 CONVERSION RATE= 0.0009 PERCENT/HR
NOX-NO3 CONVERSION RATE= 0.0063 PERCENT/HR

ALTITUDE TAL BSPSN/BSP	NOX (PPM)	NO2 (PPM)	NO3- (PPM)	NO2/NTOT (MOLE %)	NO3-/NTOT (MOLE %)	SO2 (PPM)	SO4= (UG/M3)	SO4=/STOT (MOLE %)	O3 (PPM)	PRIMARY BSP-TO (UG/M3) (10-4 M
-1)	(%)									

H+2S											
INCREMENT:	0.010	0.008	0.000	87.431	0.050	0.005	0.001	0.008	-0.008	15.919	0.1
67	0.104										
TOTAL AMB:	0.016	0.014	2.250	0.625	99.315	0.013	2.251	4.303	0.072	21.169	0.7
07	37.450										
H+1S											
INCREMENT:	0.043	0.036	0.000	84.830	0.006	0.021	0.001	0.001	-0.036	71.343	0.7
46	0.014										
TOTAL AMB:	0.049	0.042	2.250	1.830	97.881	0.029	2.251	1.918	0.044	76.593	1.2
86	20.577										
H											
INCREMENT:	0.070	0.055	0.000	77.522	0.002	0.035	0.001	0.000	-0.054	117.625	1.2
30	0.005										
TOTAL AMB:	0.076	0.060	2.250	2.598	96.716	0.043	2.251	1.311	0.026	122.875	1.7
70	14.951										
H-1S											
INCREMENT:	0.043	0.036	0.000	84.830	0.006	0.021	0.001	0.001	-0.036	71.345	0.7
46	0.014										
TOTAL AMB:	0.049	0.042	2.250	1.830	97.881	0.029	2.251	1.918	0.044	76.595	1.2
86	20.577										
H-2S											
INCREMENT:	0.010	0.008	0.000	87.450	0.050	0.005	0.001	0.008	-0.008	16.068	0.1
68	0.104										
TOTAL AMB:	0.016	0.014	2.250	0.628	99.311	0.013	2.251	4.288	0.072	21.318	0.7
08	37.368										
0											
INCREMENT:	0.003	0.002	0.000	79.762	0.260	0.001	0.002	0.040	-0.002	4.338	0.0
46	0.520										
TOTAL AMB:	0.009	0.008	2.250	0.349	99.620	0.009	2.252	5.813	0.078	9.588	0.5
86	45.194										

CUMULATIVE SURFACE DEPOSITION (MOLE FRACTION OF INITIAL FLUX)

SO2:	0.0009
NOX:	0.0009
PRIMARY PARTICULATE:	0.0001
SO4:	0.0000
NO3:	0.0000

0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion March

DOWNDOWN DISTANCE (KM) = 13.0
PLUME ALTITUDE (M) = 148.
PLUME-OBSERVER DISTANCE (KM) = 2.6
AZIMUTH OF LINE-OF-SIGHT = 111.4
ELEVATION ANGLE OF LINE-OF-SIGHT = 3.2
SOLAR ZENITH ANGLE = 80.0 AT 729. ON 3/21
SIGHT PATH IS THROUGH PLUME CENTER

THETA (LUV)	ALPHA (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y	DELYCAP	DELL	C(550)	BRATIO	DELX	DELY	E
-------------	-------------	--------	----	----------	------	---	---	---	---------	------	--------	--------	------	------	---

14.	71.	0.04	57.2	4.33	302.69	151.74	0.4051	0.3981	12.12	2.27	0.0391	0.9043	0.0047	0.0029	6
-----	-----	------	------	------	--------	--------	--------	--------	-------	------	--------	--------	--------	--------	---

0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion March

DOWNDOWN DISTANCE (KM) = 13.0
PLUME ALTITUDE (M) = 148.
PLUME-OBSERVER DISTANCE (KM) = 2.6
AZIMUTH OF LINE-OF-SIGHT = 111.4
ELEVATION ANGLE OF LINE-OF-SIGHT = 3.2
SOLAR ZENITH ANGLE = 80.0 AT 729. ON 3/21
SIGHT PATH IS AT GROUND LEVEL

THETA (LUV)	ALPHA (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y	DELYCAP	DELL	C(550)	BRATIO	DELX	DELY	E
-------------	-------------	--------	----	----------	------	---	---	---	---------	------	--------	--------	------	------	---

14.

71. 0.04 59.7 0.16 291.05 149.56 0.4006 0.3954 0.48 0.09 0.0016 0.9960 0.0002 0.0001 0

.2372 0.1935 0

HISTORY OF PLUME PARCEL AT DOWNDOWN DISTANCE = 1.0 KM

PARCEL AGE (HR)	LOCAL TIME	SO2-TO-SO4= CONVERSION RATE (%/HR)						NOX-TO-HNO3 CONVERSION RATE (%/HR)					
		H+2S	H+1S	H	H-1S	H-2S	0	H+2S	H+1S	H	H-1S	H-2S	0
0.1	728	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

HISTORY OF PLUME PARCEL AT DOWNDOWN DISTANCE = 2.5 KM

PARCEL AGE (HR)	LOCAL TIME	SO2-TO-SO4= CONVERSION RATE (%/HR)						NOX-TO-HNO3 CONVERSION RATE (%/HR)					
		H+2S	H+1S	H	H-1S	H-2S	0	H+2S	H+1S	H	H-1S	H-2S	0
0.1	717	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.3	728	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.47

HISTORY OF PLUME PARCEL AT DOWNDOWN DISTANCE = 5.0 KM

PARCEL AGE (HR)	LOCAL TIME	SO2-TO-SO4= CONVERSION RATE (%/HR)						NOX-TO-HNO3 CONVERSION RATE (%/HR)					
		H+2S	H+1S	H	H-1S	H-2S	0	H+2S	H+1S	H	H-1S	H-2S	0
0.1	658	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.3	710	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.36
0.6	728	0.00	0.00	0.00	0.00	0.00	0.07	0.01	0.00	0.00	0.00	0.01	0.47

HISTORY OF PLUME PARCEL AT DOWNDOWN DISTANCE = 10.0 KM

PARCEL AGE (HR)	LOCAL TIME	SO2-TO-SO4= CONVERSION RATE (%/HR)						NOX-TO-HNO3 CONVERSION RATE (%/HR)					
		H+2S	H+1S	H	H-1S	H-2S	0	H+2S	H+1S	H	H-1S	H-2S	0
0.1	621	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.3	632	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.18
0.6	651	0.00	0.00	0.00	0.00	0.00	0.04	0.01	0.00	0.00	0.00	0.01	0.28
1.3	728	0.01	0.00	0.00	0.00	0.01	0.07	0.05	0.00	0.00	0.00	0.05	0.47

HISTORY OF PLUME PARCEL AT DOWNDOWN DISTANCE = 13.0 KM

PARCEL AGE (HR)	LOCAL TIME	SO2-TO-SO4= CONVERSION RATE (%/HR)						NOX-TO-HNO3 CONVERSION RATE (%/HR)					
		H+2S	H+1S	H	H-1S	H-2S	0	H+2S	H+1S	H	H-1S	H-2S	0
0.1	558	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.3	609	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.06
0.6	628	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.10
1.3	706	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.02	0.15
1.6	728	0.02	0.00	0.00	0.00	0.02	0.05	0.12	0.02	0.01	0.02	0.12	0.37

PLOT FILE VERIFICATION

OBSERVER-BASED DATA

SKY BACKGROUND

For ground level if calculations done for both plume centerline and ground level.

NX 1 2 3 4 5

DISTANCE (KM) 1. 3. 5. 10. 13.

REDUCTION OF VISUAL

RANGE (%) 0.000 0.000 0.004 0.085 0.163

BLUE-RED RATIO

1.000 1.000 1.000 0.999 0.996

PLUME CONTRAST AT

0.55 MICRONS 0.000 0.000 0.000 0.000 0.002

OPLUME PERCEPITABILITY

DELTA E(L*A*B*) 0.003 0.005 0.008 0.054 0.194

WHITE BACKGROUND

NX 1 2 3 4 5

DISTANCE (KM) 1. 3. 5. 10. 13.

REDUCTION OF VISUAL

RANGE (%) 0.000 0.000 0.000 0.000 0.000

BLUE-RED RATIO

0.000 0.000 0.000 0.000 0.000

PLUME CONTRAST AT

0.55 MICRONS 0.000 0.000 0.000 0.000 0.000

EYE ACCOMODATED TO

BACKGROUND 0.000 0.000 0.000 0.000 0.000

EYE ACCOMODATED TO

SKY 0.000 0.000 0.000 0.000 0.000

OPLUME PERCEPTIBILITY
 DELTA E(L*A*B*) 0.000 0.000 0.000 0.000 0.000

0 GRAY BACKGROUND
 0 NX 1 2 3 4 5
 0 DISTANCE (KM) 1. 3. 5. 10. 13.

0 REDUCTION OF VISUAL
 RANGE (%) 0.000 0.000 0.000 0.000 0.000

0 BLUE-RED RATIO 0.000 0.000 0.000 0.000 0.000

0 PLUME CONTRAST AT
 0.55 MICRONS
 EYE ACCOMODATED TO
 BACKGROUND 0.000 0.000 0.000 0.000 0.000

EYE ACCOMODATED TO
 SKY 0.000 0.000 0.000 0.000 0.000

OPLUME PERCEPTIBILITY
 DELTA E(L*A*B*) 0.000 0.000 0.000 0.000 0.000

1 BLACK BACKGROUND
 0 NX 1 2 3 4 5
 0 DISTANCE (KM) 1. 3. 5. 10. 13.

0 REDUCTION OF VISUAL
 RANGE (%) 0.000 0.000 0.000 0.000 0.000

0 BLUE-RED RATIO 0.000 0.000 0.000 0.000 0.000

0 PLUME CONTRAST AT
 0.55 MICRONS
 EYE ACCOMODATED TO
 BACKGROUND 0.000 0.000 0.000 0.000 0.000

EYE ACCOMODATED TO
 SKY 0.000 0.000 0.000 0.000 0.000

OPLUME PERCEPTIBILITY
 DELTA E(L*A*B*) 0.000 0.000 0.000 0.000 0.000

1
 PLUVUE II (VERSION 96170)
 AN AIR QUALITY DISPERSION MODEL IN
 THE OTHER MODELS SECTION
 EPA SUPPORT CENTER FOR REGULATORY AIR MODELS

0
 VISUAL IMPACT ASSESSMENT FOR Hyperion June

EMISSIONS SOURCE DATA

ELEVATION OF SITE = 1220. FEET MSL
 372. METERS MSL

NO. OF UNITS = 1.

STACK HEIGHT = 160. FEET
 49. METERS

FLUE GAS FLOW RATE = 168757. CU FT/MIN
 79.63 CU M/SEC

FLUE GAS TEMPERATURE = 426. F
 492. K

FLUE GAS OXYGEN CONTENT = 3.0 MOL PERCENT

SO2 EMISSION RATE (TOTAL) = 2.34 TONS/DAY
 2.457E+01 G/SEC

NOX EMISSION RATE (TOTAL, AS NO2) = 3.37 TONS/DAY
 3.538E+01 G/SEC

PARTICULATE EMISSION RATE (TOTAL) = 2.99 TONS/DAY
 3.140E+01 G/SEC

0

METEOROLOGICAL AND AMBIENT AIR QUALITY DATA

WINDSPEED = 2.2 MILES/HR
 1.0 M/SEC

PASQUILL-GIFFORD-TURNER STABILITY CATEGORY F

LAPSE RATE = 13.82 F/1000 FT
 2.519E-02 K/M

POTENTIAL TEMPERATURE LAPSE RATE = 3.499E-02 K/M

AMBIENT TEMPERATURE = 68.0 F
 293.2 K

RELATIVE HUMIDITY = 83.0 %

MIXING DEPTH = 0.0 M

AMBIENT PRESSURE = 0.96 ATM

BACKGROUND NOX CONCENTRATION = 0.006 PPM

BACKGROUND NO2 CONCENTRATION = 0.006 PPM

BACKGROUND OZONE CONCENTRATION = 0.080 PPM

BACKGROUND SO2 CONCENTRATION = 0.008 PPM

ROG = 0.1500 SIGMA = 2.0000 REFRACTIVE INDEX = 1.5000 + 0.000000
 LOG-NORMAL SIZE DISTRIBUTION (101 POINT HISTOGRAM)
 ROG = 3.0000 SIGMA = 2.2000 REFRACTIVE INDEX = 1.5000 + 0.000000
 LOG-NORMAL SIZE DISTRIBUTION (101 POINT HISTOGRAM)
 ROG = 1.0000 SIGMA = 2.0000 REFRACTIVE INDEX = 1.5000 + 0.000000
 LOG-NORMAL SIZE DISTRIBUTION (101 POINT HISTOGRAM)
 ROG = 0.0500 SIGMA = 2.0000 REFRACTIVE INDEX = 2.0000 + 1.000000
 LOG-NORMAL SIZE DISTRIBUTION (101 POINT HISTOGRAM)

BACKGROUND COARSE MODE CONCENTRATION = 3.0 UG/M3

BACKGROUND SULFATE CONCENTRATION = 2.3 UG/M3

BACKGROUND NITRATE CONCENTRATION = 2.3 UG/M3

BACKGROUND VISUAL RANGE = 49.5 KILOMETERS
 SO2 DEPOSITION VELOCITY = 1.00 CM/SEC
 NOX DEPOSITION VELOCITY = 1.00 CM/SEC
 COARSE PARTICULATE DEPOSITION VELOCITY = 0.10 CM/SEC
 SUBMICRON PARTICULATE DEPOSITION VELOCITY = 0.10 CM/SEC

AEROSOL STATISTICS

	BACKGROUND	PLUME	CARBONACEOUS AEROSOLS		
MASS MEDIAN RADIUS MICROMETERS	ACCUMULATION MODE	COARSE MODE	ACCUMULATION MODE	COARSE MODE	CARBONACEOUS AEROSOLS
	0.150	3.000	0.100	1.000	0.050
GEOMETRIC STANDARD DEVIATION	2.000	2.200	2.000	2.000	2.000
PARTICLE DENSITY G/ (CM**3)	1.500	2.500	1.500	2.500	2.000

CARBONACEOUS FRACTION OF PARTICULATE MASS EMISSIONS = 0.000

BACKGROUND ATMOSPHERIC ELEMENTAL CARBON = 0.020 UG/M**3

0

GEOMETRY OF USER-SPECIFIED PLUME-OBSERVER-SUN ORIENTATION

WIND DIRECTION (DEGREES) = 40.0

SIMULATION IS FOR 549. HOURS ON 6/21

SOLAR ZENITH ANGLE (DEGREES) = 81.1

SOLAR AZIMUTH ANGLE (DEGREES) = 66.2

GEOMETRIES FOR LINES-OF-SIGHT THROUGH PLUME PARCELS AT GIVEN DOWNWIND DISTANCES (X)

X (KM)	AZIMUTH	RP	ALPHA	BETA	THETA
1.0	51.0	13.1	11.0	0.6	17.3
2.5	52.4	11.6	12.4	0.7	16.0
5.0	55.7	9.2	15.7	0.9	13.1
10.0	73.0	4.6	33.0	1.8	9.8
13.0	111.4	2.6	71.4	3.2	45.3

1 BACKGROUND CONDITIONS

ACCUMULATION MODE MASS RADIUS	SIGMA	BSCAT.55/MASS	COARSE PARTICLE MODE MASS RADIUS	SIGMA	BSCAT.55/MASS	PRIMARY PARTICLE MODE MASS RADIUS	SIGMA	BSC
AT.55/MASS 0.1500E+00	0.2000E+01	0.1478E-01	0.3000E+01	0.2200E+01	0.3219E-03	0.1000E+01	0.2000E+01	
0.1045E-02								

REFRACTION INDEXES

ACCUMULATION MODE = 0.1500E+01 + I 0.0000E+00
 COARSE MODE = 0.1500E+01 + I 0.0000E+00
 PRIMARY AEROSOLS = 0.1500E+01 + I 0.0000E+00
 CARBONACEOUS AEROSOLS = 0.2000E+01 + I 0.1000E+01

COEFFICIENTS AT 0.55 MICROMETERS , 1./KM
 BTARAY = 0.1119E-01 BTAER = 0.6762E-01 ABSNO2 = 0.1816E-02 BTABAC = 0.7899E-01

0

CONCENTRATIONS OF AEROSOL AND GASES CONTRIBUTED BY

Hyperion June

DOWNDOWN DISTANCE (KM) = 1.0
 PLUME ALTITUDE (M) = 147.
 SIGMA Y (M) = 46.
 SIGMA Z (M) = 17.
 SO2-SO4 CONVERSION RATE= 0.0000 PERCENT/HR
 NOX-NO3 CONVERSION RATE= 0.0000 PERCENT/HR

ALTITUDE TAL -1)	BSPSN/BSP (%)	NOX (PPM)	NO2 (PPM)	NO3- (PPM)	NO2/NTOT (MOLE %)	NO3-/NTOT (MOLE %)	SO2 (PPM)	SO4-= (UG/M3)	SO4=/STOT (MOLE %)	O3 (PPM)	PRIMARY (UG/M3)	BSP-TO (10-4 M)
H+2S INCREMENT: 64 0.000	0.239	0.077	0.000	32.315	0.000	0.119	0.000	0.000	-0.077	398.383	4.1	
TOTAL AMB: 40 6.869												
H+1S INCREMENT: 63 0.000	1.070	0.082	0.000	7.639	0.000	0.534	0.000	0.000	-0.079	1785.427	18.6	
TOTAL AMB: 39 1.719												
H INCREMENT: 70 0.000	1.763	0.083	0.000	4.731	0.000	0.880	0.000	0.000	-0.080	2943.672	30.7	
TOTAL AMB: 46 1.057												
H-1S INCREMENT: 63 0.000	1.070	0.082	0.000	7.639	0.000	0.534	0.000	0.000	-0.079	1785.427	18.6	
TOTAL AMB: 39 1.719												
H-2S INCREMENT: 64 0.000	0.239	0.077	0.000	32.315	0.000	0.119	0.000	0.000	-0.077	398.383	4.1	
TOTAL AMB: 40 6.869												
0 INCREMENT: 00 0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	
TOTAL AMB: 76 49.172												

CUMULATIVE SURFACE DEPOSITION (MOLE FRACTIONOF INITIAL FLUX

SO2: 0.0000
 NOX: 0.0000
 PRIMARY PARTICULATE: 0.0000
 SO4: 0.0000
 NO3: 0.0000

0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion June

DOWNDOWN DISTANCE (KM) = 1.0
 PLUME ALTITUDE (M) = 147.
 PLUME-OBSERVER DISTANCE (KM) = 13.1
 AZIMUTH OF LINE-OF-SIGHT = 51.0
 ELEVATION ANGLE OF LINE-OF-SIGHT = 0.6
 SOLAR ZENITH ANGLE = 81.1 AT 549. ON 6/21
 SIGHT PATH IS THROUGH PLUME CENTER

THETA (LUV)	ALPHA E(LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y DELYCAP	DELL	C(550)	BRATIO	DELX	DELY	E
17. .6106	11. 7.9301	0.26	24.6	50.25	304.61	152.09	0.4168	0.4002	24.22	4.57	0.0762	0.8501	0.0075	0.0022 10
0														

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion June

DOWNDOWN DISTANCE (KM) = 1.0
 PLUME ALTITUDE (M) = 147.
 PLUME-OBSERVER DISTANCE (KM) = 13.1
 AZIMUTH OF LINE-OF-SIGHT = 51.0
 ELEVATION ANGLE OF LINE-OF-SIGHT = 0.6
 SOLAR ZENITH ANGLE = 81.1 AT 549. ON 6/21
 SIGHT PATH IS AT GROUND LEVEL

THETA (LUV)	ALPHA E (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y	DELYCAP	DELL	C (550)	BRATIO	DELX	DELY	E
-------------	---------------	--------	----	----------	------	---	---	---	---------	------	---------	--------	------	------	---

17.	11.	0.26	49.5	0.00	280.40	147.52	0.4093	0.3980	0.01	0.00	0.0000	1.0000	0.0000	0.0000	0
.0035	0.0027														
0															

CONCENTRATIONS OF AEROSOL AND GASES CONTRIBUTED BY

Hyperion June

DOWNDOWN DISTANCE (KM) = 2.5
 PLUME ALTITUDE (M) = 147.
 SIGMA Y (M) = 89.
 SIGMA Z (M) = 26.
 SO2-SO4 CONVERSION RATE= 0.0000 PERCENT/HR
 NOX-NO3 CONVERSION RATE= 0.0001 PERCENT/HR

ALTITUDE TAL	BSPSN/BSP -1)	NOX (%)	NO2 (PPM)	NO3- (PPM)	NO2/NTOT (MOLE %)	NO3-/NTOT (MOLE %)	SO2 (PPM)	SO4= (UG/M3)	SO4=/STOT (MOLE %)	O3 (PPM)	PRIMARY (UG/M3)	BSP-TO (10-4 M)
H+2S INCREMENT:	98 0.001	0.080	0.059	0.000	74.218	0.000	0.040	0.000	0.000	-0.059	133.773	1.3
TOTAL AMB:	74 16.028	0.086	0.065	2.250	2.797	96.313	0.048	2.250	1.180	0.021	139.023	2.0
H+1S INCREMENT:	67 0.000	0.359	0.080	0.000	22.262	0.000	0.179	0.000	0.000	-0.078	599.528	6.2
TOTAL AMB:	43 4.789	0.365	0.086	2.250	3.281	86.037	0.187	2.250	0.305	0.002	604.778	6.9
H INCREMENT:	32 0.000	0.592	0.084	0.000	14.102	0.000	0.296	0.000	0.000	-0.079	988.455	10.3
TOTAL AMB:	08 3.020	0.598	0.089	2.250	3.138	78.999	0.304	2.250	0.188	0.001	993.705	11.0
H-1S INCREMENT:	67 0.000	0.359	0.080	0.000	22.262	0.000	0.179	0.000	0.000	-0.078	599.528	6.2
TOTAL AMB:	43 4.789	0.365	0.086	2.250	3.281	86.037	0.187	2.250	0.305	0.002	604.778	6.9
H-2S INCREMENT:	98 0.001	0.080	0.059	0.000	74.218	0.000	0.040	0.000	0.000	-0.059	133.773	1.3
TOTAL AMB:	74 16.028	0.086	0.065	2.250	2.797	96.313	0.048	2.250	1.180	0.021	139.023	2.0
0 INCREMENT:	00 0.567	0.000	0.000	0.000	0.000	0.222	0.000	0.000	0.034	0.000	0.000	0.0
TOTAL AMB:	76 49.171	0.006	0.006	2.250	0.246	99.734	0.008	2.250	6.685	0.080	5.250	0.6

CUMULATIVE SURFACE DEPOSITION (MOLE FRACTIONOF INITIAL FLUX

SO2:	0.0000
NOX:	0.0000
PRIMARY PARTICULATE:	0.0000
SO4:	0.0000
NO3:	0.0000

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion June

DOWNDOWN DISTANCE (KM) = 2.5
 PLUME ALTITUDE (M) = 147.
 PLUME-OBSERVER DISTANCE (KM) = 11.6
 AZIMUTH OF LINE-OF-SIGHT = 52.4
 ELEVATION ANGLE OF LINE-OF-SIGHT = 0.7
 SOLAR ZENITH ANGLE = 81.1 AT 549. ON 6/21
 SIGHT PATH IS THROUGH PLUME CENTER

THETA (LUV)	ALPHA E (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y DELYCAP	DELL	C (550)	BRATIO	DELX	DELY	E
16. .8817	12. 8.8826	0.23	34.4	30.63	315.01	153.98	0.4182	0.4012	25.31	4.68	0.0766	0.8385	0.0086	0.0028 11 0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
 Hyperion June

DOWNDOWN DISTANCE (KM) = 2.5
 PLUME ALTITUDE (M) = 147.
 PLUME-OBSERVER DISTANCE (KM) = 11.6
 AZIMUTH OF LINE-OF-SIGHT = 52.4
 ELEVATION ANGLE OF LINE-OF-SIGHT = 0.7
 SOLAR ZENITH ANGLE = 81.1 AT 549. ON 6/21
 SIGHT PATH IS AT GROUND LEVEL

THETA (LUV)	ALPHA E (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y DELYCAP	DELL	C (550)	BRATIO	DELX	DELY	E
16. .0075	12. 0.0057	0.23	49.5	0.00	289.70	149.31	0.4096	0.3984	0.01	0.00	0.0000	1.0001	0.0000	0.0000 0 0

CONCENTRATIONS OF AEROSOL AND GASES CONTRIBUTED BY
 Hyperion June

DOWNDOWN DISTANCE (KM) = 5.0
 PLUME ALTITUDE (M) = 147.
 SIGMA Y (M) = 156.
 SIGMA Z (M) = 35.
 SO2-SO4 CONVERSION RATE= 0.0001 PERCENT/HR
 NOX-NO3 CONVERSION RATE= 0.0008 PERCENT/HR

ALTITUDE TAL BSPSN/BSP -1)	NOX (%)	NO2 (PPM)	NO3- (PPM)	NO2/NTOT (MOLE %)	NO3-/NTOT (MOLE %)	SO2 (PPM)	SO4= (UG/M3)	SO4=/STOT (MOLE %)	O3 (PPM)	PRIMARY (UG/M3) (10-4 M)	BSP-TO
H+2S INCREMENT: 96 0.020 TOTAL AMB: 72 26.144	0.034	0.030	0.000	86.804	0.006	0.017	0.001	0.001	-0.030	57.007	0.5
H+1S INCREMENT: 71 0.001 TOTAL AMB: 47 9.935	0.153	0.074	0.000	48.589	0.000	0.076	0.000	0.000	-0.073	255.488	2.6
H INCREMENT: 03 0.001 TOTAL AMB: 79 6.546	0.252	0.079	0.000	31.488	0.000	0.126	0.000	0.000	-0.077	421.228	4.4
H-1S INCREMENT: 71 0.001 TOTAL AMB: 47 9.935	0.153	0.074	0.000	48.589	0.000	0.076	0.000	0.000	-0.073	255.488	2.6
H-2S INCREMENT: 96 0.020 TOTAL AMB: 72 26.144	0.034	0.030	0.000	86.804	0.006	0.017	0.001	0.001	-0.030	57.007	0.5
0 INCREMENT: 02 1.386 TOTAL AMB: 78 49.059	0.000	0.000	0.000	0.000	0.549	0.000	0.000	0.085	0.000	0.151	0.0

CUMULATIVE SURFACE DEPOSITION (MOLE FRACTION OF INITIAL FLUX)

SO2: 0.0000
 NOX: 0.0000
 PRIMARY PARTICULATE: 0.0000
 SO4: 0.0000
 NO3: 0.0000

0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion June

DOWNDOWN DISTANCE (KM) = 5.0
 PLUME ALTITUDE (M) = 147.
 PLUME-OBSERVER DISTANCE (KM) = 9.2
 AZIMUTH OF LINE-OF-SIGHT = 55.7
 ELEVATION ANGLE OF LINE-OF-SIGHT = 0.9
 SOLAR ZENITH ANGLE = 81.1 AT 549. ON 6/21
 SIGHT PATH IS THROUGH PLUME CENTER

THETA (LUV)	ALPHA (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y DELYCAP	DELL	C(550)	BRATIO	DELX	DELY	E
-------------	-------------	--------	----	----------	------	---	---	-----------	------	--------	--------	------	------	---

13.	16.	0.19	39.5	20.32	350.67	160.16	0.4212	0.4032	39.34	6.84	0.1130	0.8012	0.0109	0.0042 15
-----	-----	------	------	-------	--------	--------	--------	--------	-------	------	--------	--------	--------	-----------

0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion June

DOWNDOWN DISTANCE (KM) = 5.0
 PLUME ALTITUDE (M) = 147.
 PLUME-OBSERVER DISTANCE (KM) = 9.2
 AZIMUTH OF LINE-OF-SIGHT = 55.7
 ELEVATION ANGLE OF LINE-OF-SIGHT = 0.9
 SOLAR ZENITH ANGLE = 81.1 AT 549. ON 6/21
 SIGHT PATH IS AT GROUND LEVEL

THETA (LUV)	ALPHA (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y DELYCAP	DELL	C(550)	BRATIO	DELX	DELY	E
-------------	-------------	--------	----	----------	------	---	---	-----------	------	--------	--------	------	------	---

13.	16.	0.19	49.5	0.01	311.37	153.32	0.4104	0.3990	0.04	0.01	0.0001	1.0000	0.0000	0.0000 0
-----	-----	------	------	------	--------	--------	--------	--------	------	------	--------	--------	--------	----------

0

CONCENTRATIONS OF AEROSOL AND GASES CONTRIBUTED BY

Hyperion June

DOWNDOWN DISTANCE (KM) = 10.0
 PLUME ALTITUDE (M) = 147.
 SIGMA Y (M) = 280.
 SIGMA Z (M) = 47.
 SO2-SO4 CONVERSION RATE= 0.0004 PERCENT/HR
 NOX-NO3 CONVERSION RATE= 0.0028 PERCENT/HR

ALTITUDE TAL	BSPSN/BSP	NOX (PPM)	NO2 (PPM)	NO3- (PPM)	NO2/NTOT (MOLE %)	NO3-/NTOT (MOLE %)	SO2 (PPM)	SO4-= (UG/M3)	SO4-=/STOT (MOLE %)	O3 (PPM)	PRIMARY (UG/M3)	BSP-TO (10-4 M)
--------------	-----------	-----------	-----------	------------	-------------------	--------------------	-----------	---------------	---------------------	----------	-----------------	-----------------

H+2S INCREMENT: 50 0.186	0.014	0.013	0.000	88.271	0.069	0.007	0.003	0.011	-0.013	23.841	0.2
TOTAL AMB: 26 35.962	0.020	0.018	2.250	0.813	99.107	0.015	2.253	3.655	0.067	29.091	0.9

H+1S INCREMENT: 17 0.010	0.064	0.051	0.000	80.077	0.002	0.032	0.001	0.001	-0.051	106.847	1.1
TOTAL AMB: 93 18.548	0.070	0.057	2.250	2.462	96.983	0.040	2.251	1.415	0.029	112.097	1.7

H INCREMENT: 41 0.004	0.106	0.068	0.000	64.679	0.001	0.053	0.001	0.000	-0.067	176.161	1.8
TOTAL AMB: 18 13.209	0.112	0.074	2.250	3.138	95.277	0.061	2.251	0.936	0.013	181.411	2.5

H-1S											
INCREMENT:	0.064	0.051	0.000	80.077	0.002	0.032	0.001	0.001	-0.051	106.847	1.1
17	0.010										
TOTAL AMB:	0.070	0.057	2.250	2.462	96.983	0.040	2.251	1.415	0.029	112.097	1.7
93	18.548										
H-2S											
INCREMENT:	0.014	0.013	0.000	88.272	0.069	0.007	0.003	0.011	-0.013	23.862	0.2
50	0.186										
TOTAL AMB:	0.020	0.018	2.250	0.814	99.107	0.015	2.253	3.654	0.067	29.112	0.9
26	35.953										
0											
INCREMENT:	0.002	0.001	0.000	71.353	1.085	0.001	0.005	0.167	-0.001	2.687	0.0
29	2.695										
TOTAL AMB:	0.008	0.007	2.250	0.310	99.664	0.009	2.255	6.127	0.079	7.937	0.7
05	47.269										

CUMULATIVE SURFACE DEPOSITION (MOLE FRACTIONOF INITIAL FLUX

SO2:		0.0000
NOX:		0.0000
PRIMARY PARTICULATE:		0.0000
SO4:		0.0000
NO3:		0.0000

0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion June

DOWNDOWN DISTANCE (KM) = 10.0
PLUME ALTITUDE (M) = 147.
PLUME-OBSERVER DISTANCE (KM) = 4.6
AZIMUTH OF LINE-OF-SIGHT = 73.0
ELEVATION ANGLE OF LINE-OF-SIGHT = 1.8
SOLAR ZENITH ANGLE = 81.1 AT 549. ON 6/21
SIGHT PATH IS THROUGH PLUME CENTER

THETA (LUV)	ALPHA (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y	DELYCAP	DELL	C(550)	BRATIO	DELX	DELY	E
10.	33.	0.09	44.5	10.23	386.44	165.95	0.4201	0.4043	49.65	8.14	0.1393	0.8192	0.0089	0.0046	14
.9786	12.7148														

0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion June

DOWNDOWN DISTANCE (KM) = 10.0
PLUME ALTITUDE (M) = 147.
PLUME-OBSERVER DISTANCE (KM) = 4.6
AZIMUTH OF LINE-OF-SIGHT = 73.0
ELEVATION ANGLE OF LINE-OF-SIGHT = 1.8
SOLAR ZENITH ANGLE = 81.1 AT 549. ON 6/21
SIGHT PATH IS AT GROUND LEVEL

THETA (LUV)	ALPHA (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y	DELYCAP	DELL	C(550)	BRATIO	DELX	DELY	E
10.	33.	0.09	49.4	0.17	337.66	157.96	0.4113	0.3997	0.86	0.15	0.0024	0.9963	0.0002	0.0001	0
.2690	0.2281														

0

CONCENTRATIONS OF AEROSOL AND GASES CONTRIBUTED BY
Hyperion June

DOWNDOWN DISTANCE (KM) = 13.0
PLUME ALTITUDE (M) = 147.
SIGMA Y (M) = 351.
SIGMA Z (M) = 52.
SO2-SO4 CONVERSION RATE= 0.0020 PERCENT/HR
NOX-NO3 CONVERSION RATE= 0.0141 PERCENT/HR

ALTITUDE TAL BSPSN/BSP	NOX (PPM)	NO2 (PPM)	NO3- (PPM)	NO2/NTOT (MOLE %)	NO3-/NTOT (MOLE %)	SO2 (PPM)	SO4= (UG/M3)	SO4=/STOT (MOLE %)	O3 (PPM)	PRIMARY BSP-TO (UG/M3) (10-4 M
-1)	(%)									

H+2S											
INCREMENT:	0.010	0.009	0.000	87.794	0.128	0.005	0.004	0.020	-0.009	17.128	0.1
80	0.330										
TOTAL AMB:	0.016	0.015	2.250	0.656	99.283	0.013	2.254	4.193	0.071	22.378	0.8
56	38.920										
H+1S											
INCREMENT:	0.046	0.039	0.000	84.746	0.013	0.023	0.002	0.002	-0.039	76.763	0.8
03	0.039										
TOTAL AMB:	0.052	0.045	2.250	1.947	97.742	0.031	2.252	1.820	0.041	82.013	1.4
79	22.503										
H											
INCREMENT:	0.076	0.058	0.000	76.248	0.004	0.038	0.001	0.001	-0.057	126.560	1.3
23	0.013										
TOTAL AMB:	0.082	0.064	2.250	2.730	96.491	0.046	2.251	1.235	0.023	131.810	1.9
99	16.639										
H-1S											
INCREMENT:	0.046	0.039	0.000	84.746	0.013	0.023	0.002	0.002	-0.039	76.765	0.8
03	0.039										
TOTAL AMB:	0.052	0.045	2.250	1.947	97.742	0.031	2.252	1.820	0.041	82.015	1.4
79	22.503										
H-2S											
INCREMENT:	0.010	0.009	0.000	87.815	0.128	0.005	0.004	0.020	-0.009	17.307	0.1
82	0.330										
TOTAL AMB:	0.016	0.015	2.250	0.660	99.278	0.013	2.254	4.176	0.071	22.557	0.8
58	38.835										
0											
INCREMENT:	0.003	0.002	0.000	80.323	0.678	0.001	0.006	0.103	-0.002	4.871	0.0
52	1.679										
TOTAL AMB:	0.009	0.008	2.250	0.363	99.606	0.009	2.256	5.729	0.078	10.121	0.7
28	45.793										

CUMULATIVE SURFACE DEPOSITION (MOLE FRACTIONOF INITIAL FLUX)

SO2:	0.0000
NOX:	0.0000
PRIMARY PARTICULATE:	0.0000
SO4:	0.0000
NO3:	0.0000

0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion June

DOWNDOWN DISTANCE (KM) = 13.0
PLUME ALTITUDE (M) = 147.
PLUME-OBSERVER DISTANCE (KM) = 2.6
AZIMUTH OF LINE-OF-SIGHT = 111.4
ELEVATION ANGLE OF LINE-OF-SIGHT = 3.2
SOLAR ZENITH ANGLE = 81.1 AT 549. ON 6/21
SIGHT PATH IS THROUGH PLUME CENTER

THETA (LUV)	ALPHA (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y	DELYCAP	DELL	C(550)	BRATIO	DELX	DELY	E
-------------	-------------	--------	----	----------	------	---	---	---	---------	------	--------	--------	------	------	---

45.	71.	0.05	48.0	3.12	131.09	110.94	0.3919	0.3865	-2.50	-0.80	-0.0186	0.9544	0.0027	0.0023	2
-----	-----	------	------	------	--------	--------	--------	--------	-------	-------	---------	--------	--------	--------	---

.4113 2.0934 0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion June

DOWNDOWN DISTANCE (KM) = 13.0
PLUME ALTITUDE (M) = 147.
PLUME-OBSERVER DISTANCE (KM) = 2.6
AZIMUTH OF LINE-OF-SIGHT = 111.4
ELEVATION ANGLE OF LINE-OF-SIGHT = 3.2
SOLAR ZENITH ANGLE = 81.1 AT 549. ON 6/21
SIGHT PATH IS AT GROUND LEVEL

THETA (LUV)	ALPHA (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y	DELYCAP	DELL	C(550)	BRATIO	DELX	DELY	E
-------------	-------------	--------	----	----------	------	---	---	---	---------	------	--------	--------	------	------	---

45.

.0988 0.0855

0
HISTORY OF PLUME PARCEL AT DOWNDOWN DISTANCE = 1.0 KM

PARCEL AGE (HR)	LOCAL TIME	SO2-TO-SO4= CONVERSION RATE (%/HR)						NOX-TO-HNO3 CONVERSION RATE (%/HR)					
		H+2S	H+1S	H	H-1S	H-2S	0	H+2S	H+1S	H	H-1S	H-2S	0
0.1	548	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

0
HISTORY OF PLUME PARCEL AT DOWNDOWN DISTANCE = 2.5 KM

PARCEL AGE (HR)	LOCAL TIME	SO2-TO-SO4= CONVERSION RATE (%/HR)						NOX-TO-HNO3 CONVERSION RATE (%/HR)					
		H+2S	H+1S	H	H-1S	H-2S	0	H+2S	H+1S	H	H-1S	H-2S	0
0.1	537	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
0.3	548	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	1.27	

0
HISTORY OF PLUME PARCEL AT DOWNDOWN DISTANCE = 5.0 KM

PARCEL AGE (HR)	LOCAL TIME	SO2-TO-SO4= CONVERSION RATE (%/HR)						NOX-TO-HNO3 CONVERSION RATE (%/HR)					
		H+2S	H+1S	H	H-1S	H-2S	0	H+2S	H+1S	H	H-1S	H-2S	0
0.1	518	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
0.3	530	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.00	1.01	
0.6	548	0.00	0.00	0.00	0.00	0.00	0.18	0.03	0.00	0.00	0.03	1.27	

0
HISTORY OF PLUME PARCEL AT DOWNDOWN DISTANCE = 10.0 KM

PARCEL AGE (HR)	LOCAL TIME	SO2-TO-SO4= CONVERSION RATE (%/HR)						NOX-TO-HNO3 CONVERSION RATE (%/HR)					
		H+2S	H+1S	H	H-1S	H-2S	0	H+2S	H+1S	H	H-1S	H-2S	0
0.1	440	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
0.3	452	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.60	
0.6	511	0.00	0.00	0.00	0.00	0.00	0.12	0.01	0.00	0.00	0.01	0.85	
1.3	548	0.02	0.00	0.00	0.00	0.02	0.18	0.12	0.01	0.00	0.01	1.25	

0
HISTORY OF PLUME PARCEL AT DOWNDOWN DISTANCE = 13.0 KM

PARCEL AGE (HR)	LOCAL TIME	SO2-TO-SO4= CONVERSION RATE (%/HR)						NOX-TO-HNO3 CONVERSION RATE (%/HR)					
		H+2S	H+1S	H	H-1S	H-2S	0	H+2S	H+1S	H	H-1S	H-2S	0
0.1	418	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
0.3	429	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.14	
0.6	448	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.18	
1.3	526	0.01	0.00	0.00	0.00	0.01	0.06	0.04	0.00	0.00	0.04	0.43	
1.6	548	0.04	0.01	0.00	0.01	0.04	0.14	0.30	0.04	0.01	0.04	0.97	

1
0
PLOT FILE VERIFICATION
OBSERVER-BASED DATA0
SKY BACKGROUND0
For ground level if calculations done for both plume centerline and ground level.0
0
NX 1. 2. 3. 4. 5.
DISTANCE (KM) 1. 3. 5. 10. 13.0
REDUCTION OF VISUAL
RANGE (%) 0.000 0.000 0.007 0.167 0.1200
BLUE-RED RATIO 1.000 1.000 1.000 0.996 0.9980
PLUME CONTRAST AT
0.55 MICRONS 0.000 0.000 0.000 0.002 -0.0010
OPLUME PERCEPTIBILITY
DELTA E(L*A*B*) 0.003 0.006 0.007 0.228 0.0860
WHITE BACKGROUND
NX 1. 2. 3. 4. 5.0
DISTANCE (KM) 1. 3. 5. 10. 13.0
REDUCTION OF VISUAL
RANGE (%) 0.000 0.000 0.000 0.000 0.0000
BLUE-RED RATIO 0.000 0.000 0.000 0.000 0.0000
PLUME CONTRAST AT
0.55 MICRONS
EYE ACCOMODATED TO
BACKGROUND 0.000 0.000 0.000 0.000 0.0000
EYE ACCOMODATED TO
SKY 0.000 0.000 0.000 0.000 0.000

OPLUME PERCEPTIBILITY

DELTA E (L*A*B*)	0.000	0.000	0.000	0.000	0.000
------------------	-------	-------	-------	-------	-------

0 GRAY BACKGROUND

NX	1	2	3	4	5
----	---	---	---	---	---

DISTANCE (KM)	1.	3.	5.	10.	13.
---------------	----	----	----	-----	-----

0 REDUCTION OF VISUAL

RANGE (%)	0.000	0.000	0.000	0.000	0.000
-----------	-------	-------	-------	-------	-------

0 BLUE-RED RATIO

	0.000	0.000	0.000	0.000	0.000
--	-------	-------	-------	-------	-------

0 PLUME CONTRAST AT

0.55 MICRONS

EYE ACCOMODATED TO					
--------------------	--	--	--	--	--

BACKGROUND	0.000	0.000	0.000	0.000	0.000
------------	-------	-------	-------	-------	-------

EYE ACCOMODATED TO					
--------------------	--	--	--	--	--

SKY	0.000	0.000	0.000	0.000	0.000
-----	-------	-------	-------	-------	-------

OPLUME PERCEPTIBILITY

DELTA E (L*A*B*)	0.000	0.000	0.000	0.000	0.000
------------------	-------	-------	-------	-------	-------

1 BLACK BACKGROUND

NX	1	2	3	4	5
----	---	---	---	---	---

DISTANCE (KM)	1.	3.	5.	10.	13.
---------------	----	----	----	-----	-----

0 REDUCTION OF VISUAL

RANGE (%)	0.000	0.000	0.000	0.000	0.000
-----------	-------	-------	-------	-------	-------

0 BLUE-RED RATIO

	0.000	0.000	0.000	0.000	0.000
--	-------	-------	-------	-------	-------

0 PLUME CONTRAST AT

0.55 MICRONS

EYE ACCOMODATED TO					
--------------------	--	--	--	--	--

BACKGROUND	0.000	0.000	0.000	0.000	0.000
------------	-------	-------	-------	-------	-------

EYE ACCOMODATED TO					
--------------------	--	--	--	--	--

SKY	0.000	0.000	0.000	0.000	0.000
-----	-------	-------	-------	-------	-------

OPLUME PERCEPTIBILITY

DELTA E (L*A*B*)	0.000	0.000	0.000	0.000	0.000
------------------	-------	-------	-------	-------	-------

1
 PLUVUE II (VERSION 96170)
 AN AIR QUALITY DISPERSION MODEL IN
 THE OTHER MODELS SECTION
 EPA SUPPORT CENTER FOR REGULATORY AIR MODELS

0
 VISUAL IMPACT ASSESSMENT FOR Hyperion September

EMISSIONS SOURCE DATA

ELEVATION OF SITE = 1220. FEET MSL
 372. METERS MSL

NO. OF UNITS = 1.

STACK HEIGHT = 160. FEET
 49. METERS

FLUE GAS FLOW RATE = 168757. CU FT/MIN
 79.63 CU M/SEC

FLUE GAS TEMPERATURE = 426. F
 492. K

FLUE GAS OXYGEN CONTENT = 3.0 MOL PERCENT

SO2 EMISSION RATE (TOTAL) = 2.34 TONS/DAY
 2.457E+01 G/SEC

NOX EMISSION RATE (TOTAL, AS NO2) = 3.37 TONS/DAY
 3.538E+01 G/SEC

PARTICULATE EMISSION RATE (TOTAL) = 2.99 TONS/DAY
 3.140E+01 G/SEC

0

METEOROLOGICAL AND AMBIENT AIR QUALITY DATA

WINDSPEED = 2.2 MILES/HR
 1.0 M/SEC

PASQUILL-GIFFORD-TURNER STABILITY CATEGORY F

LAPSE RATE = 13.82 F/1000 FT
 2.519E-02 K/M

POTENTIAL TEMPERATURE LAPSE RATE = 3.499E-02 K/M

AMBIENT TEMPERATURE = 62.0 F
 289.8 K

RELATIVE HUMIDITY = 80.0 %

MIXING DEPTH = 0.0 M

AMBIENT PRESSURE = 0.96 ATM

BACKGROUND NOX CONCENTRATION = 0.006 PPM

BACKGROUND NO2 CONCENTRATION = 0.006 PPM

BACKGROUND OZONE CONCENTRATION = 0.080 PPM

BACKGROUND SO2 CONCENTRATION = 0.008 PPM

ROG = 0.1500 SIGMA = 2.0000 REFRACTIVE INDEX = 1.5000 + 0.000000
 LOG-NORMAL SIZE DISTRIBUTION (101 POINT HISTOGRAM)
 ROG = 3.0000 SIGMA = 2.2000 REFRACTIVE INDEX = 1.5000 + 0.000000
 LOG-NORMAL SIZE DISTRIBUTION (101 POINT HISTOGRAM)
 ROG = 1.0000 SIGMA = 2.0000 REFRACTIVE INDEX = 1.5000 + 0.000000
 LOG-NORMAL SIZE DISTRIBUTION (101 POINT HISTOGRAM)
 ROG = 0.0500 SIGMA = 2.0000 REFRACTIVE INDEX = 2.0000 + 1.000000
 LOG-NORMAL SIZE DISTRIBUTION (101 POINT HISTOGRAM)

BACKGROUND COARSE MODE CONCENTRATION = 3.0 UG/M3

BACKGROUND SULFATE CONCENTRATION = 2.3 UG/M3

BACKGROUND NITRATE CONCENTRATION = 2.3 UG/M3

BACKGROUND VISUAL RANGE = 54.9 KILOMETERS
 SO2 DEPOSITION VELOCITY = 1.00 CM/SEC
 NOX DEPOSITION VELOCITY = 1.00 CM/SEC
 COARSE PARTICULATE DEPOSITION VELOCITY = 0.10 CM/SEC
 SUBMICRON PARTICULATE DEPOSITION VELOCITY = 0.10 CM/SEC

AEROSOL STATISTICS

	BACKGROUND	PLUME	CARBONACEOUS AEROSOLS		
MASS MEDIAN RADIUS MICROMETERS	ACCUMULATION MODE	COARSE MODE	ACCUMULATION MODE	COARSE MODE	CARBONACEOUS AEROSOLS
	0.150	3.000	0.100	1.000	0.050
GEOMETRIC STANDARD DEVIATION	2.000	2.200	2.000	2.000	2.000
PARTICLE DENSITY G/ (CM**3)	1.500	2.500	1.500	2.500	2.000

CARBONACEOUS FRACTION OF PARTICULATE MASS EMISSIONS = 0.000

BACKGROUND ATMOSPHERIC ELEMENTAL CARBON = 0.020 UG/M**3

0

GEOMETRY OF USER-SPECIFIED PLUME-OBSERVER-SUN ORIENTATION

WIND DIRECTION (DEGREES) = 40.0

SIMULATION IS FOR 713. HOURS ON 9/21

SOLAR ZENITH ANGLE (DEGREES) = 79.6

SOLAR AZIMUTH ANGLE (DEGREES) = 98.6

GEOMETRIES FOR LINES-OF-SIGHT THROUGH PLUME PARCELS AT GIVEN DOWNWIND DISTANCES (X)

X (KM)	AZIMUTH	RP	ALPHA	BETA	THETA
1.0	51.0	13.1	11.0	0.6	48.3
2.5	52.4	11.6	12.4	0.7	46.9
5.0	55.7	9.2	15.7	0.9	43.6
10.0	73.0	4.6	33.0	1.8	26.8
13.0	111.4	2.6	71.4	3.2	14.6

1 BACKGROUND CONDITIONS

ACCUMULATION MODE MASS RADIUS	SIGMA	BSCAT.55/MASS	COARSE PARTICLE MODE MASS RADIUS	SIGMA	BSCAT.55/MASS	PRIMARY PARTICLE MODE MASS RADIUS	SIGMA	BSC
AT.55/MASS 0.1500E+00 0.1045E-02	0.2000E+01	0.1307E-01	0.3000E+01	0.2200E+01	0.3219E-03	0.1000E+01	0.2000E+01	

REFRACTION INDEXES

ACCUMULATION MODE = 0.1500E+01 + I 0.0000E+00
 COARSE MODE = 0.1500E+01 + I 0.0000E+00
 PRIMARY AEROSOLS = 0.1500E+01 + I 0.0000E+00
 CARBONACEOUS AEROSOLS = 0.2000E+01 + I 0.1000E+01

COEFFICIENTS AT 0.55 MICROMETERS , 1./KM
 BTARAY = 0.1119E-01 BTAER = 0.5994E-01 ABSNO2 = 0.1798E-02 BTABAC = 0.7130E-01

0

CONCENTRATIONS OF AEROSOL AND GASES CONTRIBUTED BY

Hyperion September

DOWNDOWN DISTANCE (KM) = 1.0
 PLUME ALTITUDE (M) = 147.
 SIGMA Y (M) = 46.
 SIGMA Z (M) = 17.
 SO2-SO4 CONVERSION RATE= 0.0000 PERCENT/HR
 NOX-NO3 CONVERSION RATE= 0.0000 PERCENT/HR

ALTITUDE TAL -1)	BSPSN/BSP (%)	NOX (PPM)	NO2 (PPM)	NO3- (PPM)	NO2/NTOT (MOLE %)	NO3-/NTOT (MOLE %)	SO2 (PPM)	SO4= (UG/M3)	SO4=/STOT (MOLE %)	O3 (PPM)	PRIMARY (UG/M3)	BSP-TO (10-4 M)
H+2S INCREMENT: 08 0.000	0.235	0.077	0.000	32.579	0.000	0.118	0.000	0.000	-0.076	393.023	4.1	
TOTAL AMB: 08 6.248												
H+1S INCREMENT: 12 0.000	1.055	0.082	0.000	7.733	0.000	0.527	0.000	0.000	-0.079	1761.403	18.4	
TOTAL AMB: 11 1.547												
H INCREMENT: 56 0.000	1.740	0.083	0.000	4.790	0.000	0.868	0.000	0.000	-0.080	2904.064	30.3	
TOTAL AMB: 55 0.950												
H-1S INCREMENT: 12 0.000	1.055	0.082	0.000	7.733	0.000	0.527	0.000	0.000	-0.079	1761.403	18.4	
TOTAL AMB: 11 1.547												
H-2S INCREMENT: 08 0.000	0.235	0.077	0.000	32.579	0.000	0.118	0.000	0.000	-0.076	393.022	4.1	
TOTAL AMB: 08 6.248												
0 INCREMENT: 00 0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	
TOTAL AMB: 99 49.066												

CUMULATIVE SURFACE DEPOSITION (MOLE FRACTIONOF INITIAL FLUX

SO2: 0.0000
 NOX: 0.0000
 PRIMARY PARTICULATE: 0.0000
 SO4: 0.0000
 NO3: 0.0000

0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion September

DOWNDOWN DISTANCE (KM) = 1.0
 PLUME ALTITUDE (M) = 147.
 PLUME-OBSERVER DISTANCE (KM) = 13.1
 AZIMUTH OF LINE-OF-SIGHT = 51.0
 ELEVATION ANGLE OF LINE-OF-SIGHT = 0.6
 SOLAR ZENITH ANGLE = 79.6 AT 713. ON 9/21
 SIGHT PATH IS THROUGH PLUME CENTER

THETA (LUV)	ALPHA (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y DELYCAP	DELL	C(550)	BRATIO	DELX	DELY	E
48. .5580	11. 1.8005	0.24	29.0	47.20	111.41	104.25	0.3749	0.3780	-3.11	-1.11	-0.0225	1.0545	-0.0027	-0.0005 2
0														

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion September

DOWNDOWN DISTANCE (KM) = 1.0
 PLUME ALTITUDE (M) = 147.
 PLUME-OBSERVER DISTANCE (KM) = 13.1
 AZIMUTH OF LINE-OF-SIGHT = 51.0
 ELEVATION ANGLE OF LINE-OF-SIGHT = 0.6
 SOLAR ZENITH ANGLE = 79.6 AT 713. ON 9/21
 SIGHT PATH IS AT GROUND LEVEL

THETA (LUV)	ALPHA E (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y	DELYCAP	DELL	C (550)	BRATIO	DELX	DELY	E
-------------	---------------	--------	----	----------	------	---	---	---	---------	------	---------	--------	------	------	---

48.	11.	0.24	54.9	0.00	114.52	105.36	0.3775	0.3785	0.00	0.00	0.0000	1.0000	0.0000	0.0000	0
.0033	0.0024														
0															

CONCENTRATIONS OF AEROSOL AND GASES CONTRIBUTED BY

Hyperion September

DOWNDOWN DISTANCE (KM) = 2.5
 PLUME ALTITUDE (M) = 147.
 SIGMA Y (M) = 89.
 SIGMA Z (M) = 26.
 SO2-SO4 CONVERSION RATE= 0.0000 PERCENT/HR
 NOX-NO3 CONVERSION RATE= 0.0002 PERCENT/HR

ALTITUDE TAL	BSPSN/BSP -1)	NOX (%)	NO2 (PPM)	NO3- (PPM)	NO2/NTOT (MOLE %)	NO3-/NTOT (MOLE %)	SO2 (PPM)	SO4= (UG/M3)	SO4=/STOT (MOLE %)	O3 (PPM)	PRIMARY (UG/M3)	BSP-TO (10-4 M)
H+2S INCREMENT:	81 0.001	0.079	0.058	0.000	73.462	0.000	0.040	0.000	0.000	-0.058	132.100	1.3
TOTAL AMB:	80 14.853	0.085	0.064	2.250	2.738	96.354	0.048	2.250	1.192	0.022	137.350	1.9
H+1S INCREMENT:	88 0.000	0.355	0.080	0.000	22.470	0.000	0.177	0.000	0.000	-0.078	592.032	6.1
TOTAL AMB:	88 4.333	0.361	0.085	2.250	3.275	86.185	0.185	2.250	0.309	0.002	597.282	6.7
H INCREMENT:	03 0.000	0.585	0.083	0.000	14.250	0.000	0.292	0.000	0.000	-0.079	976.096	10.2
TOTAL AMB:	02 2.723	0.591	0.089	2.250	3.137	79.205	0.300	2.250	0.191	0.001	981.346	10.8
H-1S INCREMENT:	88 0.000	0.355	0.080	0.000	22.470	0.000	0.177	0.000	0.000	-0.078	592.032	6.1
TOTAL AMB:	88 4.333	0.361	0.085	2.250	3.275	86.185	0.185	2.250	0.309	0.002	597.282	6.7
H-2S INCREMENT:	81 0.001	0.079	0.058	0.000	73.462	0.000	0.040	0.000	0.000	-0.058	132.100	1.3
TOTAL AMB:	80 14.853	0.085	0.064	2.250	2.738	96.354	0.048	2.250	1.192	0.022	137.350	1.9
0 INCREMENT:	00 0.522	0.000	0.000	0.000	0.000	0.229	0.000	0.000	0.036	0.000	0.000	0.0
TOTAL AMB:	99 49.065	0.006	0.005	2.250	0.244	99.734	0.008	2.250	6.685	0.080	5.250	0.5

CUMULATIVE SURFACE DEPOSITION (MOLE FRACTIONOF INITIAL FLUX

SO2:	0.0000
NOX:	0.0000
PRIMARY PARTICULATE:	0.0000
SO4:	0.0000
NO3:	0.0000

0	VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS Hyperion September
---	---

DOWNDOWN DISTANCE (KM) = 2.5
 PLUME ALTITUDE (M) = 147.
 PLUME-OBSERVER DISTANCE (KM) = 11.6
 AZIMUTH OF LINE-OF-SIGHT = 52.4
 ELEVATION ANGLE OF LINE-OF-SIGHT = 0.7
 SOLAR ZENITH ANGLE = 79.6 AT 713. ON 9/21
 SIGHT PATH IS THROUGH PLUME CENTER

THETA (LUV)	ALPHA E (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y DELYCAP	DELL	C (550)	BRATIO	DELX	DELY	E			
47.																	
.5173	1.3440	0	12.	0.21	39.7	27.70	114.56	105.37	0.3781	0.3798	-3.56	-1.24	-0.0270	1.0235	-0.0007	0.0005	1

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
 Hyperion September

DOWNDOWN DISTANCE (KM) = 2.5
 PLUME ALTITUDE (M) = 147.
 PLUME-OBSERVER DISTANCE (KM) = 11.6
 AZIMUTH OF LINE-OF-SIGHT = 52.4
 ELEVATION ANGLE OF LINE-OF-SIGHT = 0.7
 SOLAR ZENITH ANGLE = 79.6 AT 713. ON 9/21
 SIGHT PATH IS AT GROUND LEVEL

THETA (LUV)	ALPHA E (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y DELYCAP	DELL	C (550)	BRATIO	DELX	DELY	E			
47.																	
.0067	0.0050	0	12.	0.21	54.9	0.00	118.12	106.61	0.3788	0.3794	0.00	0.00	0.0000	1.0001	0.0000	0.0000	0

CONCENTRATIONS OF AEROSOL AND GASES CONTRIBUTED BY
 Hyperion September

DOWNDOWN DISTANCE (KM) = 5.0
 PLUME ALTITUDE (M) = 147.
 SIGMA Y (M) = 156.
 SIGMA Z (M) = 35.
 SO2-SO4 CONVERSION RATE= 0.0001 PERCENT/HR
 NOX-NO3 CONVERSION RATE= 0.0009 PERCENT/HR

ALTITUDE TAL	BSPSN/BSP	NOX (%)	NO2 (PPM)	NO3- (PPM)	NO2/NTOT (MOLE %)	NO3-/NTOT (MOLE %)	SO2 (PPM)	SO4-= (UG/M3)	SO4-=/STOT (MOLE %)	O3 (PPM)	PRIMARY (UG/M3) (10-4 M)	BSP-TO
-1)	(%)											
H+2S INCREMENT: 89 0.020	0.034	0.029	0.000	85.833	0.007	0.017	0.001	0.001	-0.029	56.317	0.5	
TOTAL AMB: 88 24.763	0.040	0.035	2.250	1.518	98.265	0.025	2.251	2.256	0.051	61.567	1.1	
H+1S INCREMENT: 38 0.001	0.151	0.074	0.000	48.682	0.000	0.075	0.000	0.000	-0.073	252.393	2.6	
TOTAL AMB: 38 9.085	0.157	0.079	2.250	3.299	93.470	0.083	2.250	0.682	0.007	257.643	3.2	
H INCREMENT: 50 0.001	0.249	0.079	0.000	31.710	0.000	0.124	0.000	0.000	-0.076	416.126	4.3	
TOTAL AMB: 49 5.943	0.255	0.085	2.250	3.387	89.810	0.132	2.250	0.431	0.004	421.376	4.9	
H-1S INCREMENT: 38 0.001	0.151	0.074	0.000	48.682	0.000	0.075	0.000	0.000	-0.073	252.393	2.6	
TOTAL AMB: 38 9.085	0.157	0.079	2.250	3.299	93.470	0.083	2.250	0.682	0.007	257.643	3.2	
H-2S INCREMENT: 89 0.020	0.034	0.029	0.000	85.833	0.007	0.017	0.001	0.001	-0.029	56.317	0.5	
TOTAL AMB: 88 24.763	0.040	0.035	2.250	1.518	98.265	0.025	2.251	2.256	0.051	61.567	1.1	
0 INCREMENT: 02 1.231	0.000	0.000	0.000	0.000	0.546	0.000	0.000	0.085	0.000	0.147	0.0	
TOTAL AMB: 01 48.942	0.006	0.006	2.250	0.247	99.730	0.008	2.250	6.652	0.080	5.397	0.6	

CUMULATIVE SURFACE DEPOSITION (MOLE FRACTION OF INITIAL FLUX)

SO2: 0.0000
 NOX: 0.0000
 PRIMARY PARTICULATE: 0.0000
 SO4: 0.0000
 NO3: 0.0000

0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion September

DOWNDOWN DISTANCE (KM) = 5.0
 PLUME ALTITUDE (M) = 147.
 PLUME-OBSERVER DISTANCE (KM) = 9.2
 AZIMUTH OF LINE-OF-SIGHT = 55.7
 ELEVATION ANGLE OF LINE-OF-SIGHT = 0.9
 SOLAR ZENITH ANGLE = 79.6 AT 713. ON 9/21
 SIGHT PATH IS THROUGH PLUME CENTER

THETA (LUV)	ALPHA E (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y DELYCAP	DELL	C (550)	BRATIO	DELX	DELY	E
-------------	---------------	--------	----	----------	------	---	---	-----------	------	---------	--------	------	------	---

44.	16.	0.17	45.8	16.54	123.25	108.36	0.3835	0.3829	-4.21	-1.40	-0.0322	0.9866	0.0017	0.0016	1
.9693	1.8354														

0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion September

DOWNDOWN DISTANCE (KM) = 5.0
 PLUME ALTITUDE (M) = 147.
 PLUME-OBSERVER DISTANCE (KM) = 9.2
 AZIMUTH OF LINE-OF-SIGHT = 55.7
 ELEVATION ANGLE OF LINE-OF-SIGHT = 0.9
 SOLAR ZENITH ANGLE = 79.6 AT 713. ON 9/21
 SIGHT PATH IS AT GROUND LEVEL

THETA (LUV)	ALPHA E (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y DELYCAP	DELL	C (550)	BRATIO	DELX	DELY	E
-------------	---------------	--------	----	----------	------	---	---	-----------	------	---------	--------	------	------	---

44.	16.	0.17	54.9	0.00	127.46	109.76	0.3818	0.3813	0.01	0.00	0.0000	1.0002	0.0000	0.0000	0
.0098	0.0074														

0

CONCENTRATIONS OF AEROSOL AND GASES CONTRIBUTED BY
Hyperion September

DOWNDOWN DISTANCE (KM) = 10.0
 PLUME ALTITUDE (M) = 147.
 SIGMA Y (M) = 280.
 SIGMA Z (M) = 47.
 SO2-SO4 CONVERSION RATE= 0.0005 PERCENT/HR
 NOX-NO3 CONVERSION RATE= 0.0032 PERCENT/HR

ALTITUDE TAL	BSPSN/BSP	NOX (PPM)	NO2 (PPM)	NO3- (PPM)	NO2/NTOT (MOLE %)	NO3-/NTOT (MOLE %)	SO2 (PPM)	SO4-= (UG/M3)	SO4-=/STOT (MOLE %)	O3 (PPM)	PRIMARY (UG/M3)	BSP-TO (10-4 M)
--------------	-----------	-----------	-----------	------------	-------------------	--------------------	-----------	---------------	---------------------	----------	-----------------	-----------------

H+2S INCREMENT:	47	0.014	0.012	0.000	87.438	0.073	0.007	0.003	0.012	-0.012	23.557	0.2
TOTAL AMB:	46	0.175										
	34.812											

H+1S INCREMENT:	04	0.063	0.050	0.000	79.105	0.002	0.032	0.001	0.001	-0.050	105.575	1.1
TOTAL AMB:	03	0.011										
	17.276											

H INCREMENT:	20	0.104	0.067	0.000	64.318	0.001	0.052	0.001	0.000	-0.066	174.063	1.8
TOTAL AMB:	19	0.005										
	12.162											

H-1S											
INCREMENT:	0.063	0.050	0.000	79.105	0.002	0.032	0.001	0.001	-0.050	105.575	1.1
04	0.011										
TOTAL AMB:	0.069	0.056	2.250	2.407	97.014	0.040	2.251	1.428	0.030	110.825	1.7
03	17.276										
H-2S											
INCREMENT:	0.014	0.012	0.000	87.438	0.073	0.007	0.003	0.012	-0.012	23.577	0.2
47	0.175										
TOTAL AMB:	0.020	0.018	2.250	0.800	99.114	0.015	2.253	3.674	0.068	28.827	0.8
46	34.804										
0											
INCREMENT:	0.002	0.001	0.000	70.784	1.096	0.001	0.005	0.170	-0.001	2.627	0.0
28	2.438										
TOTAL AMB:	0.008	0.007	2.250	0.306	99.665	0.009	2.255	6.139	0.079	7.877	0.6
28	46.974										

CUMULATIVE SURFACE DEPOSITION (MOLE FRACTIONOF INITIAL FLUX

0											
SO2:	0.0000										
NOX:	0.0000										
PRIMARY PARTICULATE:	0.0000										
SO4:	0.0000										
NO3:	0.0000										

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion September

DOWNDOWN DISTANCE (KM) = 10.0
PLUME ALTITUDE (M) = 147.
PLUME-OBSERVER DISTANCE (KM) = 4.6
AZIMUTH OF LINE-OF-SIGHT = 73.0
ELEVATION ANGLE OF LINE-OF-SIGHT = 1.8
SOLAR ZENITH ANGLE = 79.6 AT 713. ON 9/21
SIGHT PATH IS THROUGH PLUME CENTER

THETA (LUV)	ALPHA E (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y	DELYCAP	DELL	C(550)	BRATIO	DELX	DELY	E
-------------	---------------	--------	----	----------	------	---	---	---	---------	------	--------	--------	------	------	---

27.	33.	0.08	51.4	6.32	196.56	129.28	0.3988	0.3928	-3.20	-0.78	-0.0188	0.9221	0.0048	0.0030	4
.5226	3.5146														
0															

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion September

DOWNDOWN DISTANCE (KM) = 10.0
PLUME ALTITUDE (M) = 147.
PLUME-OBSERVER DISTANCE (KM) = 4.6
AZIMUTH OF LINE-OF-SIGHT = 73.0
ELEVATION ANGLE OF LINE-OF-SIGHT = 1.8
SOLAR ZENITH ANGLE = 79.6 AT 713. ON 9/21
SIGHT PATH IS AT GROUND LEVEL

THETA (LUV)	ALPHA E (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y	DELYCAP	DELL	C(550)	BRATIO	DELX	DELY	E
-------------	---------------	--------	----	----------	------	---	---	---	---------	------	--------	--------	------	------	---

27.	33.	0.08	54.8	0.09	199.71	130.05	0.3941	0.3899	-0.05	-0.01	-0.0003	0.9986	0.0001	0.0001	0
.0757	0.0587														
0															

CONCENTRATIONS OF AEROSOL AND GASES CONTRIBUTED BY

Hyperion September

DOWNDOWN DISTANCE (KM) = 13.0
PLUME ALTITUDE (M) = 147.
SIGMA Y (M) = 351.
SIGMA Z (M) = 52.
SO2-SO4 CONVERSION RATE= 0.0023 PERCENT/HR
NOX-NO3 CONVERSION RATE= 0.0161 PERCENT/HR

ALTITUDE TAL BSPSN/BSP	NOX (PPM)	NO2 (PPM)	NO3- (PPM)	NO2/NTOT (MOLE %)	NO3-/NTOT (MOLE %)	SO2 (PPM)	SO4= (UG/M3)	SO4=/STOT (MOLE %)	O3 (PPM)	PRIMARY BSP-TO (UG/M3) (10-4 M
-1)	(%)									

H+2S											
INCREMENT:	0.010	0.009	0.000	86.999	0.138	0.005	0.004	0.022	-0.009	16.925	0.1
77	0.319										
TOTAL AMB:	0.016	0.015	2.250	0.645	99.288	0.013	2.254	4.212	0.071	22.175	0.7
77	37.930										
H+1S											
INCREMENT:	0.045	0.038	0.000	83.730	0.015	0.023	0.002	0.003	-0.038	75.852	0.7
93	0.039										
TOTAL AMB:	0.051	0.044	2.250	1.905	97.765	0.031	2.252	1.836	0.042	81.102	1.3
93	21.142										
H											
INCREMENT:	0.075	0.056	0.000	75.400	0.004	0.037	0.001	0.001	-0.056	125.058	1.3
07	0.014										
TOTAL AMB:	0.081	0.062	2.250	2.672	96.529	0.045	2.251	1.248	0.024	130.308	1.9
07	15.434										
H-1S											
INCREMENT:	0.045	0.038	0.000	83.730	0.015	0.023	0.002	0.003	-0.038	75.854	0.7
93	0.039										
TOTAL AMB:	0.051	0.044	2.250	1.905	97.765	0.031	2.252	1.836	0.042	81.104	1.3
93	21.142										
H-2S											
INCREMENT:	0.010	0.009	0.000	87.018	0.138	0.005	0.004	0.022	-0.009	17.098	0.1
79	0.319										
TOTAL AMB:	0.016	0.015	2.250	0.649	99.284	0.013	2.254	4.196	0.071	22.348	0.7
79	37.842										
0											
INCREMENT:	0.003	0.002	0.000	79.585	0.771	0.001	0.007	0.118	-0.002	4.771	0.0
51	1.702										
TOTAL AMB:	0.009	0.008	2.250	0.358	99.609	0.009	2.257	5.748	0.078	10.021	0.6
50	45.370										

CUMULATIVE SURFACE DEPOSITION (MOLE FRACTIONOF INITIAL FLUX

SO2:	0.0000
NOX:	0.0000
PRIMARY PARTICULATE:	0.0000
SO4:	0.0000
NO3:	0.0000

0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion September

DOWNDOWN DISTANCE (KM) = 13.0
PLUME ALTITUDE (M) = 147.
PLUME-OBSERVER DISTANCE (KM) = 2.6
AZIMUTH OF LINE-OF-SIGHT = 111.4
ELEVATION ANGLE OF LINE-OF-SIGHT = 3.2
SOLAR ZENITH ANGLE = 79.6 AT 713. ON 9/21
SIGHT PATH IS THROUGH PLUME CENTER

THETA (LUV)	ALPHA (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y	DELYCAP	DELL	C(550)	BRATIO	DELX	DELY	E
-------------	-------------	--------	----	----------	------	---	---	---	---------	------	--------	--------	------	------	---

15.	71.	0.05	52.5	4.34	288.91	149.15	0.4027	0.3964	9.48	1.83	0.0313	0.9036	0.0048	0.0030	5
-----	-----	------	------	------	--------	--------	--------	--------	------	------	--------	--------	--------	--------	---

.9569 4.7205 0

VISUAL EFFECTS FOR HORIZONTAL SIGHT PATHS
Hyperion September

DOWNDOWN DISTANCE (KM) = 13.0
PLUME ALTITUDE (M) = 147.
PLUME-OBSERVER DISTANCE (KM) = 2.6
AZIMUTH OF LINE-OF-SIGHT = 111.4
ELEVATION ANGLE OF LINE-OF-SIGHT = 3.2
SOLAR ZENITH ANGLE = 79.6 AT 713. ON 9/21
SIGHT PATH IS AT GROUND LEVEL

THETA (LUV)	ALPHA (LAB)	RP/RV0	RV	%REDUCED	YCAP	L	X	Y	DELYCAP	DELL	C(550)	BRATIO	DELX	DELY	E
-------------	-------------	--------	----	----------	------	---	---	---	---------	------	--------	--------	------	------	---

15.

.2442 0.1929
0

HISTORY OF PLUME PARCEL AT DOWNDOWN DISTANCE = 1.0 KM

PARCEL AGE (HR)	LOCAL TIME	SO2-TO-SO4= CONVERSION RATE (%/HR)						NOX-TO-HNO3 CONVERSION RATE (%/HR)					
		H+2S	H+1S	H	H-1S	H-2S	0	H+2S	H+1S	H	H-1S	H-2S	0
0.1	713	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

HISTORY OF PLUME PARCEL AT DOWNDOWN DISTANCE = 2.5 KM

PARCEL AGE (HR)	LOCAL TIME	SO2-TO-SO4= CONVERSION RATE (%/HR)						NOX-TO-HNO3 CONVERSION RATE (%/HR)					
		H+2S	H+1S	H	H-1S	H-2S	0	H+2S	H+1S	H	H-1S	H-2S	0
0.1	701	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
0.3	713	0.00	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.00	1.32	

HISTORY OF PLUME PARCEL AT DOWNDOWN DISTANCE = 5.0 KM

PARCEL AGE (HR)	LOCAL TIME	SO2-TO-SO4= CONVERSION RATE (%/HR)						NOX-TO-HNO3 CONVERSION RATE (%/HR)					
		H+2S	H+1S	H	H-1S	H-2S	0	H+2S	H+1S	H	H-1S	H-2S	0
0.1	642	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
0.3	654	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.94	
0.6	713	0.00	0.00	0.00	0.00	0.00	0.19	0.03	0.00	0.00	0.03	1.32	

HISTORY OF PLUME PARCEL AT DOWNDOWN DISTANCE = 10.0 KM

PARCEL AGE (HR)	LOCAL TIME	SO2-TO-SO4= CONVERSION RATE (%/HR)						NOX-TO-HNO3 CONVERSION RATE (%/HR)					
		H+2S	H+1S	H	H-1S	H-2S	0	H+2S	H+1S	H	H-1S	H-2S	0
0.1	604	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
0.3	616	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.64	
0.6	635	0.00	0.00	0.00	0.00	0.00	0.11	0.02	0.00	0.00	0.02	0.80	
1.3	713	0.02	0.00	0.00	0.00	0.02	0.19	0.12	0.01	0.00	0.01	1.30	

HISTORY OF PLUME PARCEL AT DOWNDOWN DISTANCE = 13.0 KM

PARCEL AGE (HR)	LOCAL TIME	SO2-TO-SO4= CONVERSION RATE (%/HR)						NOX-TO-HNO3 CONVERSION RATE (%/HR)					
		H+2S	H+1S	H	H-1S	H-2S	0	H+2S	H+1S	H	H-1S	H-2S	0
0.1	542	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
0.3	553	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.13	
0.6	612	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.28	
1.3	650	0.01	0.00	0.00	0.00	0.01	0.07	0.05	0.00	0.00	0.05	0.52	
1.6	713	0.05	0.01	0.00	0.01	0.05	0.15	0.32	0.05	0.02	0.05	1.02	

PLOT FILE VERIFICATION
OBSERVER-BASED DATA

SKY BACKGROUND

For ground level if calculations done for both plume centerline and ground level.

NX 1 2 3 4 5
DISTANCE (KM) 1. 3. 5. 10. 13.

REDUCTION OF VISUAL RANGE (%) 0.000 0.000 0.005 0.095 0.169
BLUE-RED RATIO 1.000 1.000 1.000 0.999 0.996

PLUME CONTRAST AT 0.55 MICRONS 0.000 0.000 0.000 0.000 0.001
OPLUME PERCEPITABILITY DELTA E(L*A*B*) 0.002 0.005 0.007 0.059 0.193

WHITE BACKGROUND NX 1 2 3 4 5
DISTANCE (KM) 1. 3. 5. 10. 13.

REDUCTION OF VISUAL RANGE (%) 0.000 0.000 0.000 0.000 0.000
BLUE-RED RATIO 0.000 0.000 0.000 0.000 0.000

PLUME CONTRAST AT 0.55 MICRONS
EYE ACCOMODATED TO BACKGROUND 0.000 0.000 0.000 0.000 0.000
EYE ACCOMODATED TO SKY 0.000 0.000 0.000 0.000 0.000

OPLUME PERCEPTIBILITY

DELTA E(L*A*B*) 0.000 0.000 0.000 0.000 0.000

0 GRAY BACKGROUND

0 NX 1 2 3 4 5

0 DISTANCE (KM) 1. 3. 5. 10. 13.

0 REDUCTION OF VISUAL

RANGE (%) 0.000 0.000 0.000 0.000 0.000

0 BLUE-RED RATIO

0.000 0.000 0.000 0.000 0.000

0 PLUME CONTRAST AT

0.55 MICRONS

EYE ACCOMODATED TO

BACKGROUND 0.000 0.000 0.000 0.000 0.000

EYE ACCOMODATED TO

SKY 0.000 0.000 0.000 0.000 0.000

OPLUME PERCEPTIBILITY

DELTA E(L*A*B*) 0.000 0.000 0.000 0.000 0.000

1 BLACK BACKGROUND

0 NX 1 2 3 4 5

0 DISTANCE (KM) 1. 3. 5. 10. 13.

0 REDUCTION OF VISUAL

RANGE (%) 0.000 0.000 0.000 0.000 0.000

0 BLUE-RED RATIO

0.000 0.000 0.000 0.000 0.000

0 PLUME CONTRAST AT

0.55 MICRONS

EYE ACCOMODATED TO

BACKGROUND 0.000 0.000 0.000 0.000 0.000

EYE ACCOMODATED TO

SKY 0.000 0.000 0.000 0.000 0.000

OPLUME PERCEPTIBILITY

DELTA E(L*A*B*) 0.000 0.000 0.000 0.000 0.000